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18 March 1986

USSR REPORT
MILITARY AFFAIRS
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No 10, October 1985

Except where indicated otherwise in the table of contents, the following is a complete translation of the Russian-language monthly journal ZARUBEZHNOYE VOYENNOYE OBOZRENIYE, published in Moscow by the Ministry of Defense.

CONTENTS

Lead Editorial: Foreign, Domestic, Arms Policy Reviewed (pp 3-6)1

GENERAL MILITARY PROBLEMS

U.S., NATO Plans for Arctic Discussed (pp 7-12)
(A. Tsvetkov).....7

Race Problems in U.S. Armed Forces (pp 13-16)
(I. Skrylnik) (not translated)

Pakistan's Military Industry (pp 17-22)
(S. Vasilev) (not translated)

Turkish Civil Defense (pp 22-26)
(V. Burjyaev) (not translated)

GROUND FORCES

British Ground Forces Discussed (pp 27-33)
(S. Anzherskiy).....14

Improvement in NATO's Self-Propelled Artillery (pp 33-42)
(V. Nesterenko).....21

Exercise BRAVE DEFENDER (p 42)
(S. Sudzhenko) (not translated)

AIR FORCES

B-1 Bomber Program Discussed (pp 43-50) (V. Kirsanov).....	31
Struggle with Fog at Airfields (pp 50-55) (U. Travin) (not translated)	
FRG Air Force Rear Services Exercise Discussed (pp 55-57) (V. Sergeev).....	40
New Italian Aircraft (p 57) (I. Karenin) (not translated)	
Check your Knowledge. Aircraft of Capitalist Countries (p 58) (not translated)	

NAVAL FORCES

Royal Marines, Their Employment Under Arctic Conditions (pp 59-66) (A. Melnikov).....	44
New U.S. Navy Auxillaries Described (PP 66-68) (L. Monin).....	52
NATO Navies' Close-in Air Defense Systems Discussed (pp 68-73) (Yu. Tuchkov).....	54
Japan's New Guided Missile Destroyer (pp 73-74) (Yu. Yurin) (not translated)	
Soviet Military Journal on Reequipment of French Nuclear Subs (P 74) (S. Grechin).....	61

INFORMATION, EVENTS, FACTS

Pentagon's "Strategic Triangle" (p 75) (not translated)	
Command of Canadian Forces in Europe (pp 75-76) (S. Semenov).....	63
Development of F-19, Stealth Technology Noted (p 76) (Yu. Alekseev).....	64
New Designations (p 77) (not translated)	

FOREIGN MILITARY CHRONICLE (pp 79-80)
(not translated)

JOURNAL EDITOR WITH THE NORTHERN FLEET SAILORS (p 80)
(not translated)

COLOR INSERTS

British Ground Forces Motorized Infantry Subunit * American Strategic
B-1B Bomber * Italian S.211 Trainer Aircraft * American Shipboard
VULCAN-PHALANX 20-mm anti-aircraft mount

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FOREIGN MILITARY REVIEW

LEAD EDITORIAL: FOREIGN, DOMESTIC, ARMS POLICY REVIEWED

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 10, Oct 85 (Signed to press 5 Oct 85) pp 3-6

[Editorial; "The Triumph of October's Ideas";

[Text] Sixty-eight years ago the Leninist Party, the working class, and all our country's workers carried out the Great October Revolution. These were the main events of the 20th century and the revolution marked mankind's entry into a new historic epoch--the epoch of the triumph of socialism and communism opened the way for the creation on earth of a new type of civilization. In October 1917, the first workers' and peasants' state in the world was born. It was the result of the victory of Lenin's immortal teachings which had been put in place on the basis of the theoretical and practical activities of the CPSU.

Time has shown how October's revolutionary influence on the course of history and on the fate of all peoples is being strengthened. Despite the savage opposition of imperialism, the exploiter classes, all the obstacles, temporary failures, and, at times, even the retreats, the revolutionary process has developed steadily. The formation of a world socialist system, the failure of the colonial system, the liberation of more than 100 states in Asia, Africa, and Latin America, from colonial and semi-colonial dependence, the vigorous growth of the communist and workers' movement in capitalist countries is impressive evidence of the materialization of Lenin's ideas and the triumph of October's ideas. The victorious socialist and national-liberation revolutions many times narrowed imperialism's zone of predominance, and deepened even more capitalism's social crisis.

The workers of our country are celebrating the 68th anniversary of Great October in the year of the 40th anniversary of the Soviet people's glorious feat of arms and labor in the Great Patriotic War which the first socialist state in the world had defended in the fiercest battle, and which saved humanity from fascist slavery. This year is the year for preparing for the 27th CPSU Congress which will be marked by the country of the Soviets' new labor accomplishments.

Soviet society today is a society of a highly-developed economy. The country's national income is now more than 16 times higher than the pre-war level and the output of production--24 times. Today, the Soviet Union produces more cast

iron and steel, oil and gas, cement and mineral fertilizer, machine tools, tractors and grain harvesting combines, and many other types of production than any country in the world.

Soviet Society is a society which is continuously raising the people's well being. At present, the per-capita real income exceeds the pre-war level by a factor of 6. Housing construction has attained enormous scope, the network of hospitals and polyclinics, kindergardens and day-care centers, and the introduction of consumer service establishments for the population has been expanded.

Our society is a society with a high level of education and culture for the people and a rich spiritual life. At present, 82 out of 100 workers have a higher or middle education, but before the war, there were only 5. Our contemporary is a person of wide cultural and political horizon, and of high intellectual needs.

Today, the most important social problems have been solved in Soviet society. The whole system of social relations has been raised to a new level of maturity, the union of the working class, peasants and intelligentsia has been strengthened. We have advanced even further along the road for overcoming the important differences between the city and the village and between physical and mental labor. The flourishing of nations and nationalities is combined organizationally with their all-round approach. The Soviet people, a new social and international community, unprecedented in history, has been formed.

Soviet society today is a society of genuine workable democracy, of respect for the dignity and rights of the citizens and their lofty responsibility. The workers actively participate in the affairs of their country and their collective. The system of the people's socialist self-rule is being improved continuously.

The Soviet Union is a mighty and flourishing power, confidently paving the way to a communist future. However, we are far from exaggerating the results of what has been done. And now, when the crucial period of preparation for the regular CPSU 27th Congress has come, communists and all the Soviet people are thoroughly analyzing, and realistically evaluating that which has been achieved, mobilizing reserves, improving organizational structure and discipline in order successfully to manage the plans of the year and the 11th five-year plan as a whole.

At present, our people, under the communist party's leadership, are solving complex responsible problems. As was emphasized in the April (1985) CPSU Central Committee Plenum, the Party sees as the main task of our day the vital acceleration of social and economic progress of Soviet society, mainly in the intensive and dynamic development of the national economy which is based completely on the newest achievements of scientific and technical ideas. And it is that base which will allow providing for further growth of the people's well being, the strengthening of the economic and defensive power of the country, and the detailed perfection of the development of socialism.

At the CPSU Central Committee conference, held in June 1985, on the question of scientific and technical progress, tasks were assigned for achieving a new quality of our development, quick forward progress on strategically-important trends, the structural rebuilding of production, converting to intensive tracks and effective forms of control, and a more complete solution of social problems. The task of accelerating the country's development has today, taken on a paramount political, economic and social significance. Realizing it is an urgent, over-all party and public affair.

The Party's political course is satisfying the demands of social development and the interests and aspirations of the widest strata of workers most fully. Much attention is being paid in the name of the Party to perfecting the form of party and state leadership. The struggle for the acceleration of social and economic development, for steady and general order, the strengthening of organizational structure and discipline is finding the Soviet people's warm approval and the complete support.

The workers of socialist countries, going shoulder to shoulder on the road of precious October, are celebrating the birthday of the first workers' and peasant state in the world as the greatest holiday. On this glorious path they won, under the guidance of the Marxist-Leninist Parties, a major victory. The Council of Economic Mutual Assistance (CEMA) includes ten European, Asian and American countries. Occupying approximately 19 per cent of the earth's surface, in which less than a tenth of the planet's population lives, they produce a fourth of the world's national income, a third of the world's industrial and a fifth of the agricultural products. The CEMA countries account for approximately one-fifth of the world's output of electrical energy, a fourth of the extracted oil, a third of the natural gas and coal, smelted steel and the world's output of machine building production. The average annual rate of growth of the national income for the countries who were CEMA members from 1951-1983, was 6.7 per cent and for the developed capitalist countries it was 3.8 per cent.

Today, the world-wide socialist system, the way to which Great October opened, more fully reveals its inexhaustible capabilities and advantages compared to capitalism, and the drawing power of its example and invaluable historical experiences if constantly growing. World socialism has at its disposal a powerful economic and spiritual potential. Its economic and defensive power is strengthening on the basis of the development of fraternal cooperation. The strengthening of socialist economic interaction and its authority in the world is growing.

The inviolable collaboration of the socialist states, at present, is leading with irresistible force, in the struggle for progress and mankind's peaceful future. strengthening their position in the world, the fraternal people are moving confidently toward the great communist goal in a single rank. The Warsaw Pact reliably serves the development and strengthening of the all-round collaboration of the socialist states, which for over 30 years has guaranteed the sovereignty of the participating states, the security and the inviolability of their borders, is playing a large role in the business of preserving and consolidating peace in Europe and in the whole world.

The main landmarks of the foreign policy line of the CPSU and the Soviet state are determined by the great Lenin and his historic decrees concerning peace. Socialism, that is peace. It cannot but have a different policy. In the report at the festive meeting devoted to the 40th anniversary of the Soviet people's victory in the Great Patriotic War, the general secretary of the CPSU Central Committee, M. S. Gorbachev emphasized: "To defend mankind's sacred right to life, to ensure a strong peace is the duty of the living before the millions who have died for freedom and social progress and our common duty before the present and future generations." In the competition of two systems, socialism is ready to demonstrate its advantage, not with the force of weapons, but with the force of example in all the spheres of vital activity of society. The strategic line, developed by the 27th CPSU Congress, signifies that our country henceforth will be directing all its designs and affairs toward peaceful constructive work.

The first precept of the CPSU and the Soviet state in foreign policy is economy and every kind of strengthening of fraternal friendship with our most intimate brothers-in-arms and allies--the countries of the great socialist commonwealth. Under the conditions of the complex international situation, the strengthening of unity and solidarity of the fraternal countries, the reinforcement of the coordination of their actions in the international arena assumes special significance. The Leninist Party, while struggling for peace and social progress, is always collaborating closely with fraternal communist, worker and revolutionary-democratic parties and national-liberation movements, and comes out in favor of unity and the active reciprocity of all the present revolutionary forces.

In relations with capitalist states, the Soviet Union firmly follows Lenin's course for peace and peaceful coexistence, however, it never forgoes the interests of the socialist motherland and its allies. Our country resolutely stands for the relaxation of international tension, for peaceful, mutual beneficial cooperation between states on the principles of equal rights, mutual respect and non-interference in internal affairs, ready to continue and develop a political dialog and business-like cooperation, which would lead to the normalization of the international situation.

The liquidation of the dreadful threat of nuclear conflict, which is hanging over humanity, remains a mission of special importance for our country. An understanding of the opposing forces concerning an immediate cessation of the arms race, mainly nuclear, on earth and concerning banning it in space would be the only reasonable way out of the situation which has been created. Our country is in favor of such an honest and equitable understanding, which would lead, in the end, to the complete destruction and prohibition of nuclear weapons forever, and to the final elimination of the threat of nuclear war. These goals determine the approach of the Soviet Union to the Soviet-American discussions in Geneva.

We put forth major constructive proposals, well known to the world, directed at the cessation of the arms race and the elimination of the threat of a world-wide catastrophe. Our country suggested stopping the further deployment of missiles and the immediate freezing of the nuclear potential. In order to prove convincingly its sincerity and good will, the USSR announced that it is

ceasing, unilaterally, starting on April 7, and continuing to the end of November 1985, any further deployment of its intermediate-range missiles and the implementation of other reciprocal measures in Europe. While striving to contribute to the cessation of the dangerous rivalry in building up nuclear potential, the Soviet Union undertook a new step: From 6 August 1985, the day of the Hiroshima tragedy, it unilaterally ceased all nuclear explosions. This moratorium was announced up to 1 January 1986, but it will be kept in effect even beyond, if the U.S., on its side, also abstains from conducting nuclear explosions.

The Soviet Union's new initiatives evoked a positive response the world over. Together with our people, wide circles of the peace-loving international community, because the Soviet proposals reveal reassuring prospects for restraining the arms race and lessening international tensions, are creating favorable conditions for concluding an international treaty concerning a full and universal prohibition of nuclear weapon tests.

However, their implementation is constantly being hindered by imperialism which is threatening the world with nuclear catastrophe. American militarism is found on the front lines of the military threat to humanity. Washington's policy is acquiring a still greater military character, and has become a constant negative factor for international relations.

The U.S. administration announced its negative attitude toward the Soviet's peaceful proposals, having completely groundlessly qualified them as "propaganda." That reaction of Washington calls forth a rightful doubt concerning the sincerity of its announcements concerning the readiness to come to an agreement concerning the reduction of nuclear armaments at the Geneva talks. The United States continues to create around our country, and the other socialist states, newer and newer military bases, and to stir up military conflicts in various regions of the planet.

The U.S. is attempting to tie to international cooperation its pretenses for certain exclusiveness and especially the predestination in history. Only in this way is it possible to explain their imperial demands for "zones of vitally-important interests," for the "right" to interfere in the internal affairs of other states, and to "encourage" or "instruct" sovereign countries and peoples subject to Washington's whims.

The enemies of the normalization of international relations are fanning anti-Sovietism and anti-communism, poisoning the political climate in the world, and attempting to impede the mutual understanding and cooperation of states with different social systems. They stop at nothing to achieve their goal, and come running to such threatening operations as preparations for aggression against Nicaragua, introducing a trade embargo with socialist countries, spreading fabrications about the "Soviet military threat" or organizing the shameful court of law in Rome over a citizen of socialist Bulgaria.

The Soviet Union is aware of the scale of the military threat and is aware of its responsibilities for the fate of the world and not for one day is it ceasing to struggle for controlling the arms race and for averting war. It

will not tolerate a violation of the military-strategic balance between the USSR and the U.S., the Warsaw Pact and NATO.

We are coming out decisively against a spread of the arms race into space, not because we will not be able to respond to those aggressive plans of Washington. Our goal is to place a reliable barrier on the path of the militarization of space. However, as the USSR Minister of Defense, Marshal of the Soviet Union, S. L. Sokolov announced, if the U.S. begins the militarization of space, and undermining thereby the existing military-strategic balance, the Soviet Union will be compelled to take reciprocal measures to restore the status concerning the areas of both defensive and offensive weapons. The USSR will choose those modes of action which best meet the interest of its defense capability and not those to which the Washington leaders would like to subject it to. "I consider it necessary, with all directness, to emphasize that our measures will be identical to that threat which might be created to the Soviet Union and its allies," said the USSR minister of defense.

The complexity of the present international situation, which had been created through the fault of the imperialist powers, calls for the necessity of further strengthening the Soviet people's vigilance and their readiness at any time, with weapons in hand, to take the field for the defense of socialist achievements. Thanks to the tireless concern of the CPSU, the selfless work of the Soviet people, the armed forces of the country of the Soviets possess high potential. In their power is embodied powerful production forces, scientific and technical achievements, our society's, social, political and ideological unity and the durable indestructable friendship of the people of the USSR.

Responding to the concern of the Communist Party, the Soviet government, people and armed forces personnel persistently are improving their combat mastery. The country of the Soviets' armed defenders vigilantly serve in bleak Zapolyar, in the sultry south, in the Carpathian foothills, and on our Far Eastern borders--everywhere in the boundless expanse of the Motherland, on the seas and oceans.

30 The Soviet people can be confident: their socialist achievements, peaceful creative work, sovereignty and territorial integrity are well protected. Our heroic army and navy, shoulder to shoulder with the fraternal Warsaw Pact armies, are ready to deal an immediate crushing blow to any aggression, from wherever it may come.

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FOREIGN MILITARY REVIEW

U.S., NATO PLANS FOR ARCTIC DISCUSSED

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 10, Oct 85 (Signed to press 5, Oct 85) pp 7-12

[Article by Col A. Tsvetkov, doctor of military sciences; "The Arctic in U.S. and NATO Plans"]

[Text] The situation in the world has remained complex and dangerous in recent years through the fault of the U.S. imperialists and their NATO allies. More and more, states and regions are being drawn into a zone of militaristic preparations. This does not exclude the arctic basin, extending from Greenland to Alaska, which the command of the armed forces of the imperialist states began to actively open up in the late 1970s.

The study of the Arctic for military purposes was begun by the U.S. Navy command, which had signed a contract in 1947, for year-round study of Point Barrow in the interests of their fleet. Simultaneous with the development of these projects, American air force planes began regular flights on the Fairbanks - North Pole - Fairbanks route for meteorological and ice observations. In 1954, the Canadian Coast Guard icebreaker LABRADOR first completed a crossing along the northern coast of America from east to west, and within three years travelled from west to east, though this time it led three American ships.

In 1958, the nuclear submarines NAUTILUS and SKATE conducted oceanographic observations in the central regions of the arctic basin. The most important result of their research, as the commander of one sub announced, was getting assurance that the U.S. Navy could use the regions of the far north as a TVD on a year-round basis. Since 1981, the U. S. has been studying the arctic waters which lap the coast of the Soviet Union directly.

Subsequent events completely confirmed that the arctic basin began to play a highly important role in the aggressive plans of the American imperialists and their NATO allies. This is primarily manifested in the conversion of Greenland, Iceland, Norway and Alaska into unique springboards for aggression against the USSR and the other members of the socialist community, and in the use of the Arctic Ocean by enemy submarines, icebreakers, spy ships and espionage-sabotage groups to penetrate to the Soviet Union's shores along the shortest route.

The NATO military-political leadership's interest in the above region is explained by its exceptionally important military strategic position. It plans to launch strikes from there against vitally important objectives in the USSR and the other countries of the Warsaw Pact. It takes into consideration, for example, that Norway (one of the bloc's members) has a common border with the Soviet Union extending 196 km, and that the Soviet island of Ratmanov is only 4 km from Alaska. Viewing Greenland, Iceland, Norway, Alaska, and the waters of the Arctic Ocean as a jumping-off place for aggression, the U.S. and NATO commands (primarily the Americans) want to avoid, thereby, retaliatory strikes against targets in the United States itself. Besides this, it is believed that without these polar bases, it would be difficult to conduct combat actions in the Central European TVD. NATO's northern flank, and the lines of communication between American and Western Europe, along which reserves for overseas would be transported, would be vulnerable. Great significance is likewise placed on the sea routes from the Atlantic to the USSR's northern regions, the establishment of control over the exits of the Baltic and Barents Seas to the ocean. The shortest air routes from the U.S. to deep regions of the Soviet Union lie here, a fact the Strategic Air Command has taken into consideration. American imperialism has assigned a unique role in its aggressive plans to the northwestern sector of the country--the Alaska zone--a useful springboard for an invasion of the USSR's northeastern regions.

Serious attention is devoted to the Danish island of Greenland and to Iceland, which supposedly "bar" exit from the Arctic Ocean to the Atlantic. Taking this situation into account, the U.S. and NATO commands established a string of military bases on these islands.

Greenland, the largest island on the globe, surrounded by the Arctic and Atlantic Oceans, includes an area of 2,176,000 km² with a population of 51,000 (according to 1982 data). The majority of it is covered by glaciers and is uninhabitable. Only a narrow rocky stretch of coast carved up by numerous fjords, is free of ice. The U.S. command has built two air bases on Greenland's west coast, including the Arctic's largest-- Thule. and a system of ship bases, and has deployed radar stations for detecting and tracking ballistic missiles.

NATO countries' airborne, air forces and other units and subunits periodically work out questions of combat readiness under arctic conditions on the island's territory. Exercises are organized and new models of weapons, military techniques and equipment are tested.

Iceland, a small island country (103,000 km² in area, population 226,000) plays the role of NATO's "unsinkable aircraft carrier." Through the efforts of U.S. and British imperialist circles, it was drawn into NATO in 1949, and since 1951 American troops (in excess of 3,000 men) and military bases have been located on its territory. Specifically, a large U.S. air base whose staff numbers more than 1,000 people, sufficiently well prepared for operations in the Arctic, operates in the city of Keflavik, (50 km west of Reykjavik). In mid-1985, there were plans to begin to upgrade the armaments of the units with the more modern F-15 jets (replacing the 12 F-4E) and to increase their numbers by half again. The reconstruction of a fuel depot in the city of Hafnarfjordur, which will receive American ships, is being

completed. A large number of radio relay and tropospheric communication stations and radar posts, whose equipment soon will be modernized, have been built on the island and two new posts have been constructed. In foreign specialists' opinion, the chief task of the American troops in the country is serving the Greenland-Iceland-Norway anti-submarine line, as well as early detection and warning sites for the U.S. antiaircraft system and the America-Europe tropospheric communication lines.

The USSR's northern neighbor is Norway, whose territory (from the island of Spitsbergen to Jan Mayen Island) covers 387,000 km² with a population of 4.1 million. In foreign specialists' estimation, Norway occupies a favorable strategic position. From her territory, control can be exercised over the sea routes connecting the Atlantic and Arctic Oceans, as well as the air space uniting the North American continent with the northwestern regions of the Soviet Union along a straight line. In planning active combat actions in the polar region, NATO's specialists take into consideration the peculiarities of its geographic position and the diversity of climatic conditions, which can be extreme, especially in the winter, and which will affect the operations of ground troops and air forces. It is estimated that the units and subunits could suffer significant losses due to the severe (below -40° C.) cold. In view of this, supplying personnel and combat equipment with everything needed has become the top priority of the commands and headquarters.

Plans for operations in Northern Europe include troops and the fleets of primarily the following six bloc members: Norway, Denmark, the FRG, Great Britain, the U.S. and Canada, where each of the latter three will allocate a specific contingent of troops to reinforce the armed forces permanently located in a given TVD.

In foreign specialists' estimation, the group of NATO forces established in the northern European TVD lag in number and combat equipment significantly behind the troops deployed in other regions of the European war theatre. Therefore, the main task facing them is carrying out active combat operations in the most important areas of northern Norway and the Baltic Straits zone.

In peacetime, Norway has deployed and integrated only a portion of its armed forces, into NATO combined arms units, while the remainder are placed at the disposal of the bloc's command during direct preparation for unleashing a war, or during exercises.

The Norwegian armed forces are represented by regular ground forces (19,000 men), the air force (9,500 men) and the navy (7,500 men), as well as many reserve units (215,000 men).

The ground forces are the armed forces' main service. They include regular troops, mobilization exercise units and subunits, reserve unit staffs designated for deploying new formations at their respective bases at time of mobilization. The NORTH motorized infantry brigade is considered to be the most combat ready, along with the tank and artillery subunits, which are ready to undertake combat operations in the polar region. In just the first few days, Norway could deploy an additional 11 infantry brigades and several logistic units and subunits.

The country's ground forces have large contingents (in excess of 80,000 men) of irregular forces--"khemverna"--the largest portion of which will also be included in combat operations in southern Norway (against air or naval assault landings, command-type reconnaissance groups, conducting so-called "partisan actions," as well as securing and defending important objectives).

Norway's air forces are comprised of two aviation commands, to which the following squadrons are subordinated: tactical fighters (5 squadrons, 107 aircraft), reconnaissance, transport (2), helicopter (3), and training squadrons and the NIKE HERCULES air defense guided missile division (36 launchers).

The largest airfields are located in Bodo, Anneyya, Erlann, Sula, and Ryugge. Almost all of them have landing strips of 2,000-3,000 m and are equipped with modern radio navigation equipment.

The Norwegian navy has 14 diesel submarines, 5 frigates, 2 small anti-submarine ships, 13 mine sweepers and mine layers, 39 missile boats and 3 patrol boats, and 7 small assault ships. There are three naval bases on the country's territory at Khokonsvern, Olafsværn, Ramsund, and 5 basing points and 35 ports.

NATO's command envisions a constant refinement process for various ways of reinforcing the groupings deployed in the zones by transporting troops both within a given theatre as well as from other European TVDs and the American continent. Judging by Western press reports, plans for NATO's northern flank call for moving 3-4 motorized infantry battalions and 3-4 air squadrons taken from the bloc's mobile forces in Europe, as well as additional contingents from the U.S. (a reinforced marine brigade, is moved periodically to Norway for exercises), Great Britain (a marine brigade and specific ground forces units), and Canada (a brigade). Besides the bloc's mobile forces, plans call for moving to this area 8-10 air combat squadrons from the air forces of U.S., Great Britain, the FRG and Canada.

An important role in ground troop support during arctic combat operations has been assigned to a permanent NATO naval formation in the Atlantic, including 5-6 destroyers and frigates, which periodically sail off the Norwegian coast. Several multi-purpose carrier groups of NATO's Atlantic strike force have participated in operations during exercises in Norway and in the Sea of Norway. The North Atlantic bloc's command devotes a great deal of attention to the operational facilities in the territories of NATO's northern flank, such as expansion of the network of airfields, reconstruction of naval bases, pipeline construction, building dug-in control centers, communications networks, warehouses (including underground) and other military projects.

Norway has deployed a wide network of radar centers and posts for NATO and its own armored forces. Tropospheric communication lines traverse her territory. On Jan Mayen and Langoy islands, long range LORAN stations were erected for the use of the U.S. Navy and Air Force. Construction of a U.S. global omega system radio navigation station has been completed in the Bratland region and in Bodo--a large radio communications center for control of the American nuclear submarines in North Atlantic waters.

The Spitsbergen Archipelago, too, is being drawn into the sphere of military preparations, although according to the 1920 Treaty of Paris, Norway cannot permit it to be used for military purposes. In the late 1960s a station was built there for the purpose of tracking satellites and other objects in space.

Norway's territory has been turned into a NATO training ground. Matters concerning the combat training of units and subunits from the U.S., Great Britain, Canada, the FRG and other member countries are systematically worked out there. Exercises involving the bloc's mobile forces are held regularly, in which 12,000-15,000 troops usually participate, including 5,000-7,000 foreign servicemen. For example, the NATO Cold Winter-85 exercise, held in northern Norway in March of 1985, once again demonstrated the special interest of the pact's political leadership in actively opening up arctic bridgeheads in the north of Europe. This was affirmed by U.S. Marine General P. Kelly, who was present at the exercises and who openly fought for expansion of the militarist preparations in that region, and for the rapid completion of weapons depots for the American Marine brigade.

The NATO countries, and above all the U.S. and Great Britain, make active use of Norwegian territory for espionage and other subversive activities against the USSR. The Norwegian intelligence service and secret police extend direct assistance to the imperialist secret services. At one time the American U-2 spy plane, hit by the Soviet missile forces above Sverdlovsk was forced to land at the Bodo airfield. American reconnaissance planes have repeatedly violated Soviet air space from Norwegian territory. American submarines systematically appear near our state border in the Barents Sea. High-ranking NATO generals and officers frequently visit the province of Finnmark. Besides this, constant observation of Soviet border regions is carried out from here.

The Pentagon's strategists have always considered, and do so today, that the northernmost U.S. state, Alaska, located in direct proximity to the Soviet Union, to be an important springboard whose use could unleash aggression in that area. The French military journal, REVIEW DE DEFENCE NATIONAL, has called it a "Gibraltar, the eyes and ears of the arctic."

Candid statements about the strategic value of Alaska are carried in the pages of the magazine NATIONAL DEFENSE, in which two former American intelligence agents described in detail the options for U.S. armed forces to invade Siberia from bases in Alaska, Japan and South Korea. They cynically propose an accelerated buildup of troops and equipment in the northern Pacific directed against the northeastern regions of the USSR. In addition to this, they recommend placement of cruise missiles there in order to "introduce the nuclear aspect in the plans to attack the Soviet Union." This article includes a map of probable targets in the northeastern part of the USSR. From this the intelligence purposes of the South Korean jet on a mission for the American special services in September, 1983, became clear.

The U.S. has a relatively large contingent of troops in Alaska (1,519,000 km² in area, more than 300,000 population).

In peacetime, command over each of the services deployed in the region is given to the ranking air force officer in the given zone (HQ in Elmendorf).

The ground troop grouping numbers almost 8,000 men. It includes the 172nd Detached Infantry Brigade, a detached army air battalion and other units. Besides this, detached National Guard infantry battalions are located in Alaska (in Nome, Bethel, and Anchorage). The personnel of these subunits are called up for two weeks every year and are regularly included in exercises.

The U.S. Air Force Alaskan Command and units and subunits of other commands (strategic, transport, communications, security and EW, as well as the Air National Guard) number about 12,000, with up to 50 combat and 30 auxiliary aircraft. They are stationed at three major air bases, Elmendorf, Allison, Shima, and two advance airfields (Gleena and King Salmon), and at 13 advance points where there are radar posts and anti defense centers.

U.S. Naval forces in the area number almost 4,000, which are part of the Seattle Naval Base. In an emergency, plans call for creating unified operational units, which will include forces and equipment of the air force command, the 172nd Infantry Brigade, navy patrol aviation and reinforcement units. They comprise an advance force devoted to unleashing aggression.

Annual exercises (Polar Siege, Polar Strike, The Frost series and others) are held in Alaska with the participation of all services deployed there and those moved from the U.S. and Canada for this purpose.

The Pentagon has turned Alaska into a testing ground on which new rifle, tank, artillery and air defense weapon systems, aircraft, ships and other military equipment as well as special ammunition for the troops, are tried out under arctic conditions. The airfields and ports are being modernized, highways built, and new communication lines and command points constructed. Besides this, the fuel and energy base is being expanded (large oil deposits in the Prudhoe Bay are being developed and electric power stations erected).

Thus, Alaska completes the network of arctic military training areas, prepared by NATO for aggressive operations against the USSR and the other countries of the socialists commonwealth.

In March, 1985, the U.S. President, R. Reagan, and the Canadian Prime Minister, B. Mulvaney, signed an agreement on modernizing the joint U.S.-Canadian space command for the defense of the North American continent, which includes a long range radar detection system. The radar units of this system are located at radar posts (about 30), which are placed at 70° N in the territory of Alaska, Canada and Greenland. In accordance with the agreement, it is envisioned that this line will be replaced by a new one (by setting up more than 50 radar sites and locating them in northern Alaska and in the arctic regions of Canada).

However, it would be incorrect to limit the strategic value of the arctic basin to the mere presence of NATO military bases there. The shortest route from the U.S. to the USSR passes through this region.

Taking this situation into consideration. U.S. and NATO strategists not only determined the direction of the flight of their ICBMs across the North Pole, but also took note of the routes for strategic bombers over the Arctic Ocean and determined the courses for SSBNs. They figured, for example, that a MINUTEMAN-3 missile, launched from the Minot (South Dakota) missile base, can reach targets in the Central Urals in less than a half hour. In their estimation, the most appropriate routes for the American strategic bombers across the polar basin are the American continent - Greenland - USSR coast (almost 10,000 km) and the American continent - Alaska - North Pole - USSR coast (12,000 km). In-flight refueling is envisioned in both situations, for which a number of air bases have air tankers at a high state of readiness.

In the arctic skies there is a constant stream of reconnaissance planes of the U.S., Norway, Great Britain, which systematically appear along the Soviet shores, as well as above drifting polar stations.

The American imperialists place special hopes for the Arctic Ocean on the use of SSBNs surface ships and carrier-based aviation. As U.S. Navy Secretary J. Lehman announced, "The U.S. plans in the arctic must rely more and more on modern naval power." The U.S. and NATO commands chose Norwegian and Greenland waters as well as the eastern part of the Pacific, including the Gulf of Alaska, as its main areas of SSBN patrols. This does not exclude the use of the Arctic Ocean for this purpose. The distance of the above patrol areas from vitally important centers in the Soviet Union is only about 4,000 km.

There are recorded cases of U.S. Coast Guard icebreakers with helicopters on board appearing off the borders of the USSR, from which they conduct air and electronic surveillance of coastal regions and islands. A landing of enemy agents and saboteurs from the helicopters, as well as from commercial ships heading for Soviet polar ports, is not ruled out. The appearance of special submarines with spies and saboteurs aboard along the shores of our northern seas is also possible.

The facts presented affirm that the Arctic has been assigned an important role in the aggressive plans of the U.S. and NATO. All of this compels Soviet soldiers constantly to raise their combat readiness, political vigilance and military skill.

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FOREIGN MILITARY REVIEW

BRITISH GROUND FORCES DISCUSSED

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 10, Oct 85 (Signed to press 5 Oct 85) pp 27-33

[Article by Lt Col S. Anzherskiy; "British Ground Forces;" passages rendered in all capital letters printed in boldface in source]

[Text] The British armed forces are organized in accordance with the military policies of the conservative government, which is currently characterized by its active support of every U.S. military-political measure within the aggressive NATO bloc and by encouraging the arms race. Thus, a great deal of attention is devoted to raising the forces' combat and mobilization readiness, perfecting the organizational structure of the armed forces branches, raising their strategic and tactical mobility, increasing the fire and striking power of formations and units, improving the quality of operational and combat training of headquarters and forces, and equipping forces with modern weapons and combat equipment. The accomplishment of all these measures permit, according to proclamations of the English military-political leadership, "increasing Britain's contribution to NATO."

GENERAL CHARACTERISTICS OF THE ARMY. As reported in the foreign military press, the armed forces, numbering 325,900 personnel, include the land forces, air force, navy and reserve components. The land force is the largest service and is intended for combat in coordination with the air force and navy, and as a component of the NATO combined arms force in the European theater of war employing both conventional and nuclear weapons. It consists of regular and territorial forces and is divided into branches (armor, infantry-mechanized infantry, artillery, army-aviation, engineers, signal, and special forces) and services (transport, artillery-technical, repair-rebuild, medical, finance, military police, postal, and others.)

The armored troops are the principal land forces strike force. They are the most capable of conducting offensive actions under nuclear conditions and are organized in armor divisions and in separate tank and cavalry regiments.

The infantry (motorized infantry) is intended for combat operations to defeat the enemy and seize and hold sections of terrain or objectives. There is one motorized infantry division, separate infantry (motorized infantry) brigades and battalions.

Artillery, as a branch, includes the artillery division, as well as units and subunits, which is organizationally included in the complement of the combined arms formations and carries out fire missions in all types of battles and operations in the interests of other branches. It possesses tube and rocket artillery, operational-tactical missiles, anti-tank and guided missiles, tactical air defense and artillery reconnaissance.

Army aviation comprises helicopters units and organizations (separate squadrons and wings), which are organizationally components of combined arms formations.

Engineers are intended to provide engineer support of the combat activities of formations and units. They comprise engineer regiments (11), and separate units and organizations of various designations.

Signal troops are organized by regiments and separate signal companies, which belong to four signal groups. Their task is to organize the country's military leaders' communications with the service headquarters and with forces located both in Britain and beyond its borders.

Special forces include units and subunits which are intended to conduct reconnaissance-diversionary activities, psychological operations and other disruptive actions. There are three regiments of special forces in the land forces.

The REGULAR ARMY (161,500 personnel, in the English leadership' opinion, is the basis of the land forces. It is intended to conduct combat operations as part of NATO forces and defend the nation's ruling circles overseas interests. In its complement, judging by the latest foreign press data, there are 3 tank divisions, a motorized infantry division, and an artillery division, 13 independent motorized infantry brigades, an airborne brigade, and separate units and subunits of various branches. Organizationally, they are combined under the Land Forces Command in the FRG (British Army of the Rhine) and in Britain, as well as in small contingents in other regions of the world (Fig. 1).

The Land Forces Command in the FRG (British Army of the Rhine, headquarters in Rheindahlen, is the strongest British force (about 55,000 personnel). Western military specialists consider it a significant British contribution to NATO's military organization. Its commander is, at the same time, the commander of the Northern Army Group of the combined NATO armed forces in the Central European TVD. The foundation of this Army Group is I Corps (Headquarters in Bielefeld). This is the most combat-ready British formation, equipped with nuclear weapons and other modern armaments.

As reported in the foreign press, during a period of mobilization, the size of the English force in the FRG may be more than doubled due to an infusion of units and formations from the homeland. In wartime, the command's headquarters becomes the rear headquarters for English forces in West Germany.

The Land Forces Command on British territory includes a motorized infantry division (the 2nd), 12 independent motorized infantry and an airborne (5th) brigade, and units and subunits of combat and combat service support. All of

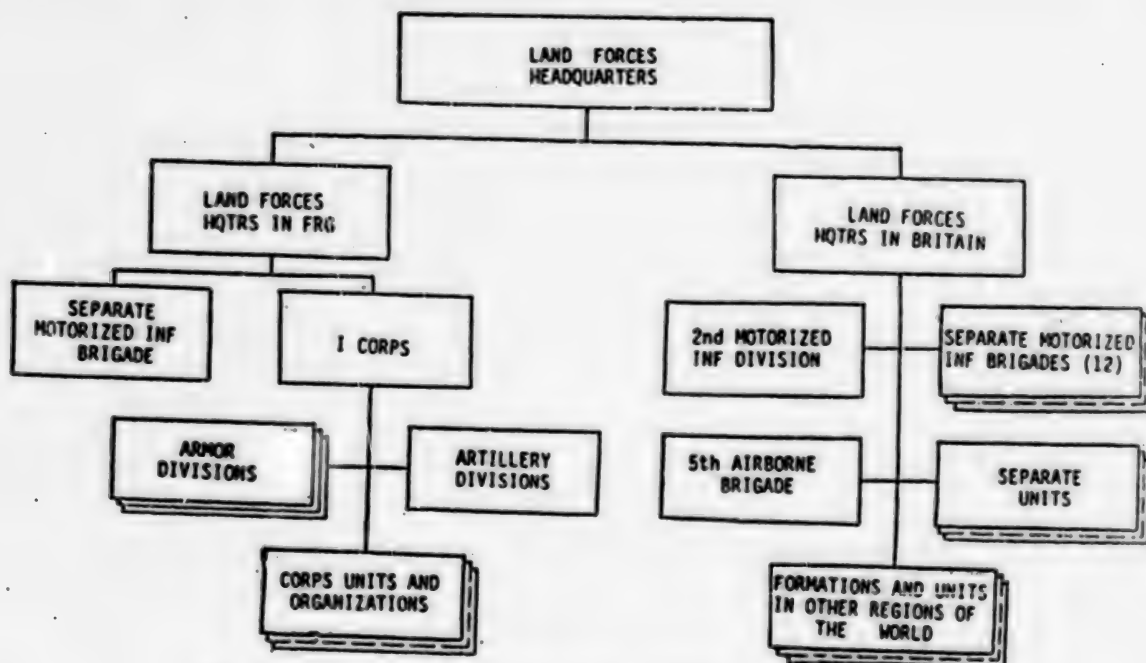


Рис. 1. Структура сухопутных войск Великобритании

Figure 1. British Ground Forces' Structure

these constitute the so-called British mobile forces, which are part of the European NATO Commander's strategic reserve. They are intended mainly for reinforcing English forces in the FRG, defense of the British Isles, and for other missions as a component of the bloc's combined arms.

In the British zone of West Berlin, there is the separate Berlin Motorized Infantry Brigade (about 3,000 personnel).

Army units and subunits located at overseas stations are intended to defend the English monopolies' interests, preserve British influence in dependent countries, as well as support reactionary regimes countering national liberation movements. On Gibraltar, the basis of the garrison is a reinforced motorized infantry battalion. Two motorized infantry battalions, and support and service organizations for an overall force of up to 3,000 personnel are stationed at British bases on Cyprus. In Hong Kong, there is an independent motorized infantry brigade, and Brunei (South East Asia) and Belize (Central America) have one independent motorized infantry battalion each.

At present, the English leadership is carrying out a general militarization of the Falkland Islands to turn them into a British outpost in the South Atlantic. According to reports in the foreign press, there are nearly 3,000 personnel in the English garrison on the archipelago who are directly subordinate to the U.K. defense chief of staff. Construction of radar stations to control the airspace over the South Atlantic basin is proceeding at an accelerated tempo. An airport for landing heavy military transports has been opened. Other projects are also on-going.

The TERRITORIAL FORCES (about 80,000) comprise the core of the land force reserve and are intended to reinforce I Corps and to defend the British Isles. Together with the formations and units stationed on British territory they serve as the mobilization base for filling out the land forces. General command of units and subunits is accomplished by the staffs of military regions. According to press data, there are 35 separate motorized infantry battalions, about 20 reconnaissance, artillery, air defense and engineer regiments, and subunits of other branches and services in these forces, which in peacetime are cadre.

The personnel training system (volunteers between 18 and 45 years old) include instruction at troop training centers (2 hours per week) and instruction in units and subunits on holidays (12 days a year). Besides, annually, summer encampments are organized (12-15 days), where personnel participate in training on different scales.

It is noted in the foreign press that the territorial forces include the so-called "Ulster Defense Brigade" (7,000 personnel), which performs a military-political function in Northern Ireland. There is also a general reserve (about 150,000) which includes those who have served a tour in the regular or territorial forces. It is intended to fill out existing units and to form new ones upon mobilization.

As reported in the foreign press, the land forces have in their arsenal 12 LANCE missile launchers, about 1,300 tanks (70 CHALLENGERS, more than 900 CHIEFTANS in various modifications, as many as 300 SCORPION light tanks), more than 600 field artillery pieces and mortars, more than 300 army helicopters, up to 180 self-propelled SWINGFIRE ATGM launchers on a SCORPION chassis and the tracked TROJAN APC, as well as the MILAN ATGM launcher. The principal component of their air defense is the RAPIER missile (108 launchers) and the mobile BLOWPIPE missile. For motorized infantry and reconnaissance personnel transport, there are about 1,700 SALADIN and FERRET armored cars, more 3,000 SARAZEN, TROJAN, SPARTAN, and SAXON APCs.

LAND FORCES ORGANIZATION. In the view of the English leadership, the corps, capable of conducting small-scale independent operations, is the highest combined arms operational-tactical formation with a permanent or temporary organization, and the division is the basic tactical formation. The motorized infantry brigade is considered a tactical formation. Units include (by branch): infantry-battalion; armor, artillery, army aviation, engineers, and signal-regiments of three or four companies.

I CORPS (about 50,000) includes the headquarters, the 1st, 3rd and 4th Armor Divisions, the 1st Artillery Division, two separate cavalry regiments, engineer and amphibious-engineer regiments, three signal regiments, a helicopter squadron, combat support and service support units.

An ARMORED DIVISION (about 16,000 personnel) has a headquarters, three tank brigade headquarters, three to five tank regiments and five motorized infantry battalions, three artillery regiments (two with 155-mm self-propelled and towed howitzers, one with 105-mm self-propelled guns), regiments of army aviation and signal engineer and transport regiments, a material-technical

support battalion, repair and medical battalions, a company of military police and other service and support subunits. It is equipped with more than 260 CHALLENGER and CHIEFTAN tanks and SCORPION light reconnaissance tanks, 24 155-mm M109A2 self-propelled howitzers and 24 towed 155-mm FH-70 howitzers, 24 105-mm self-propelled ABBOT guns, 40 81-mm mortars, 30 self-propelled STRIKER launchers with SWINGFIRE ATGMs, 120 MILAN ATGM launchers, 36 LYNX and GAZELLE helicopters, mobile BLOWPIPE anti-aircraft missiles, 84-mm handheld KARL GUSTAV grenade launchers, 7.62 mm machineguns and automatic rifles, about 2,000 armored transporters and various types of vehicles, as well as other equipment.

The tank regiment (600 personnel) consists of the headquarters, headquarters company, four tank companies (each with 14 CHIEFTAN tanks), reconnaissance platoon (light SCORPION tanks) and rear service subunits. The tank company is considered the basic combat organization of the regiment. It consists of its headquarters, four tank platoons (12 personnel and three tanks each) and one administrative company. Altogether there are 57 CHIEFTAN tanks and 8 SCORPION light tanks, more than 20 APCs and up to 50 vehicles. According to the latest reports in the English military press, the 1st Armor Division has CHALLENGER tanks in its tank platoons.

The motorized infantry battalion (700 personnel)¹ includes the headquarters, headquarters company, three motorized rifle companies and one fire support company, a reconnaissance platoon and rear service organizations. A motorized rifle company (more than 100 personnel) consists of a headquarters and three motorized rifle platoons (with three squads). It has 16 TROJAN APCs 14 7.62-mm machineguns, as well as 84-mm KARL GUSTAV grenade launchers. The fire support company has two platoons: mortar (eight 81-mm mortars) and antitank (24 MILAN ATGM launchers). Altogether, the battalion is equipped with eight 81-mm mortars, 24 Milan ATGM launchers, about 20 51-mm mortars, about 60 7.62 mm machineguns and 30 grenade launchers, up to 100 armored vehicles, about 50 other vehicles, and over 100 radios.

A M109A2 self-propelled 155-mm howitzer regiment (700 personnel) consists of a headquarters, a headquarters battery, three firing batteries (8 guns each), an air defense battery (mobile BLOWPIPE missile) and combat and rear support organizations. Altogether it has 24 howitzers.

The 155-mm FH-70 towed howitzer artillery regiment (more than 600 personnel) has a headquarters, a headquarters battery, three firing batteries of eight guns, and combat and rear service subunits.

The 105-mm self-propelled ABBOT cannon artillery regiment (more than 700 personnel) includes a headquarters, a headquarters battery, three firing batteries of eight guns, and a battery of self-propelled STRIKER launchers with SWINGFIRE ATGMs, and combat and service support organizations.

The army aviation regiment (about 400 personnel) has two antitank squadrons of 12 helicopters with ATGM, a reconnaissance squadron and an engineer support organization. Altogether the regiment has 36 helicopters, of which 24 are LYNX with TOW and 12 are GAZELLE scout helicopters, and over 60 assorted vehicles.

The 2nd MOTORIZED INFANTRY DIVISION (About 17,000 personnel) consists of a headquarters, three motorized infantry brigades of four battalions each (of which two have their assigned personnel); two reconnaissance, three artillery, one engineer and one transport regiment; an army aviation regiment, a signal regiment, and combat and service support units and organizations. The division has about 50 SCORPION light tanks, 150 guns and mortars, including the FH-70 155-mm howitzer, about 200 MILAN ATGM launchers and STRIKER launchers with SWINGFIRE ATGM, LYNX and GAZELLE helicopters, and other combat equipment. The foreign press notes that this division is intended to reinforce the group of English forces located in the FRG in I Corps.

The ARTILLERY DIVISION (about 5,000 personnel) includes six regiments of three or four batteries (one missile, three artillery, and two air defense missile batteries) and combat and service support organizations. Among its armaments are 12 LANCE missile launchers, 12 203.6-mm self-propelled howitzers, 24 175-mm self-propelled cannons, 96 RAPIER air defense missiles, remotely piloted reconnaissance vehicles, more than 400 assorted vehicles, and other weapons and military equipment.

The missile regiment consists of a headquarters, a headquarters battery, four missile batteries of three launchers each and technical and service support organizations. The regiment has 12 LANCE launchers and more than 200 vehicles.

A M107 175-mm self-propelled cannon regiment (there are two in the division) has a headquarters, a headquarters battery, two firing batteries of six guns, and combat and service support SUBUNITS. Altogether, it has 12 175-mm self-propelled cannons, over 200 vehicles and about 700 personnel.

The M110 203.2-mm self-propelled howitzer artillery regiment (about 500 personnel) consists of a headquarters, headquarters battery, three firing batteries of four guns, and combat support and service subunits.

The air defense regiment (about 600 personnel) is intended to provide tactical air defense for corps formations. It includes a headquarters, a headquarters battery, four firing batteries (three platoons of four RAPIER missiles), and combat support and service subunits.

A typical SEPARATE MOTORIZED INFANTRY BRIGADE may include a headquarters, three to five motorized infantry battalions, a tank or cavalry regiment, an artillery regiment, and several companies of combat support and service (signal, engineer, transport, repair, supply, medical), as well as a helicopter squadron and other service organizations. The number of personnel assigned is about 5,000. It may be equipped with 16 SCORPION light tanks, 18 105-mm light towed cannons, about 30 81-mm mortars, up to 20 MILAN ATGM launchers, 12 helicopters, and other weapons and military equipment.

The SEPARATE AIRBORNE BRIGADE (5th) has a headquarters, three parachute battalions, an artillery and reconnaissance regiment, as well as combat support and service subunits. The number of personnel and amount of equipment is analagous to the motorized infantry brigade. The brigade, according to reports in the foreign press, is the basic English "rapid deployment force."

It is reported in the foreign military press that plans for the future development of land forces envision further improvement of the organizational structure of units and subunits, and equipping them with modern weapons and combat equipment to raise their mobility, maneuverability, and fire power. In particular, a massive increase in the number of CHALLENGER tanks, MCV-80 infantry fighting vehicles, SAXON wheeled APCs, new multiple rocket systems, self-propelled howitzers, antitank missile systems, and third generation fire support helicopters, and other weapons and combat equipment are expected.

Foreign specialists believe that the currently-existing organization and armament of tank forces, together with the modernization program as a whole meet the demands placed on them by NATO's military-political leadership.

1. At the present time the land forces have three types of motorized infantry battalions. The first type is organic to I Corps armor divisions. The second type is intended for reinforcing the group of English forces in the FRG, and the third is for defense of the British Isles. The number of personnel assigned and the organization of the battalions are unique to each, depending on the quantity of equipment--S.A.

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FOREIGN MILITARY REVIEW

IMPROVEMENT IN NATO's SELF-PROPELLED ARTILLERY DISCUSSED

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 10, Oct 85 (Signed to press 5 Oct 85) pp 33-42

[Article by Lt Col Nesterenko; "The Improvement of NATO's Self-Propelled Artillery;" passages rendered in all capital letters printed in boldface in source]

[Text] A great deal of significance is being attached to the current U.S. "airland operation (battle)-2000" concept for field artillery. In Western military theoreticians' opinion, it should become an effective means of destroying enemy second echelon units and subunits (particularly armored vehicles). Since the early 1980s, all basic research and development work carried out in NATO in the field of artillery weaponry has been devoted to resolving this issue.

Self-propelled howitzers and guns constitute the basic field artillery of the ground forces of the leading NATO countries. As the foreign press notes, in comparison to towed artillery, they have a number of advantages, primarily in combat readiness, maneuverability, and in the ability to protect the crew members, a factor which is substantive in operations where nuclear missile weaponry is deployed. Furthermore, self-propelled artillery also must respond to the general demands placed on field artillery ordnance: long range, high firing accuracy, adequately transportable munitions, a high rate of fire (particularly during the initial most effective minutes of the artillery strike), and the ability to use various types of munitions.

Self-propelled artillery in the majority of NATO countries' armies, for the most part, is represented by the American M109 and M110 series of self-propelled howitzers with 155- and 203.2-mm calibers, respectively. They were developed back in the early 1960s (their specifications are shown in the table). These howitzers have tracked chassis specially designed for them and diesel engines; they are finished off with armor plate made of an aluminum alloy, which results in their weight not exceeding 20-30 tons. The most massive version is the 155-mm self-propelled M109 howitzer, which has become the standard artillery system in the majority of NATO countries. It is also in service in the ground forces of many other capitalist states.

TACTICAL AND TECHNICAL CHARACTERISTICS OF NATO SELF PROPELLED ARTILLERY

Designation, (Nation Developer, Year put into service)	Caliber, mm	Length of barrel, cal	HE frag projectile wgt, kg	Muzzle velocity, m/sec	Max range, km with common projectile	with reheat-assist	Unit of fire	Rate of fire, rds/min	Combat wgt, tons	Crew size	Speed, km/h	Range on one fuelling, km	NATO country where item is in service
SELF-PROPELLED HOWITZERS													
M108 (US, 1961)	108	18.1	11.5	87	22.5	88							Belgium, Spain
	23	404	15	8	5	300							
M61 (France, 1951)	105	18	15	58	10.5	60							France
	23	670	1	8	5	350							
M109 (US, 1961)	155	42.9	14.6	28	23.8	58							US, FRG, Greece, Italy, Norway, Turkey
	23	882	1	3	6	350							
M109A (US, 1973)	155	42.9	18.1	28	24	58							US, Canada, Spain, UK, the Netherlands
	30	884	24	3	6	350							
M109A2(A3) (US, 1979)	155	42.9	22	36	25	58							US, Belgium, Denmark, Greece, the Netherlands, Portugal, UK
	30	.	30	3	6	350							
SP70 (FRG, UK Italy)	155	43.8	24	40	44	68							In testing stage
	38	827	30	6	5	550							
PALMARIA (Italy 1982)	155	43.8	24	30	48	60							—
	41	.	30	4	5	400							
M110 (US, 1961)	203.2	80.7	18.8	2*	20.5	55							US, Belgium, Italy, Greece, Spain, Turkey
	25	587	—	0.5—1.5	5	730							
M110A2 (US, 1978)	203.2	80.7	24.3	2*	28	55							US, FRG, The Netherlands, UK
	37	710	29.1	0.5—1.5	5	520							
SELF PROPELLED GUNS													
ABBOT (UK, 1963)	105	18.1	17	40	18.8	48							UK
	.	.	—	10	4	300							
F3 (France, 1966)	155	43.7	20.1	25	17.4	60							France
	33	725	25.3	4	3	300							
F.1 (France, 1979)	155	43	23.5	42	42	60							France
	40	810	30	8	4	450							
M107 (US, 1961)	175	80.8	32.7	2*	28.2	55							UK, Italy, Spain, Greece, Turkey
	60	814	—	0.5—1.5	5	730							

*The main portion of the unit of fire is carried on an M548 track transporter

At the end of the 1970s and beginning in the 1980s, the M109 and the M110 howitzers were modernized both in the United States and in a number of other NATO countries. In the United States this modernization took place in stages. In the beginning, the models M109A1 and M110A1 were developed, and were put into service in 1973 and 1976, respectively. They were equipped with new ordnance with elongated barrels; rocket-assisted and cassette projectiles were introduced into the munitions inventory; and the pieces were given larger propellant charges. The firing range of the M109A1 howitzer increased from 14.6 to 18 km when firing common projectiles, and up to 24 km with rocket-assisted projectiles. The M110A1 correspondingly increased from 16.8 to 21 km and to 29.1 km.

Further work on improving these weapons and prolonging the service life in the forces has led to the appearance of the modernized variants M109A2 and A3 and M110A2 in the late 1970s, which in the 1980s became the standard models of self-propelled artillery for the American ground forces. Besides increasing the range of fire up to 24-30 km by introducing new powerful propellant charges, a number of design measures were carried out that were directed at improving individual assemblies for these howitzers. The M109A2 was outfitted with a new rammer and components and an improved anti-recoil mechanism. The rear section of the turret was widened, making it possible to increase the unit of fire to 36 rounds. The shell rack for this howitzer provides room to accommodate two M712 COPPERHEAD guided projectiles (put into service in the U.S. ground forces in 1980).

The modernized 203.2-mm M110A2 howitzer, in contrast to the M110A1, has a highly effective, dual-chambered muzzle brake which absorbs up to 30 per cent of the recoil energy. This device has made it possible to fire the new (ninth) increased propellant charge. Correspondingly, the maximum range of fire was also increased.

Starting in the early 1980s, the armies of the other NATO nations began to be equipped with the modernized models of the American M110 and M109 howitzers. Hence, the M109A2 (A3) is already in service in the ground forces of Great Britain, Belgium, Denmark, the Netherlands, Greece and Portugal, and the M110A2--in the FRG, Great Britain, and the Netherlands. Judging from reports in the foreign press, a number of other European states' commands in the bloc have been nurturing such plans.

Among the other NATO countries, Great Britain, FRG, France and Italy are engaged in creating self-propelled artillery and have self-propelled guns and howitzers in service in their own ground forces which were indigenously developed in the 60s and 70s. They include the French 105- and 155-mm howitzers (based the AMX-13 light tank and the British 105-mm ABBOT self-propelled gun (based on the TROJAN armored personnel carrier). As emphasized in the foreign press, the only modern (in service) European self-propelled field artillery piece is the French self-propelled F.1 gun (previously designated the 155 GCT, which was created in the mid-1970s and based on the AMX-30. The 155-mm caliber piece is equipped with automatic loading which assures a rate of fire of eight rounds per minute and a modern fire control system.

In the FRG, Great Britain, and Italy, joint development of the European 155-mm self-propelled SP70 howitzer is being completed. Test models of it underwent technical and troop testing starting in 1982. It is planned that delivery of the first serial models of the howitzers will begin delivery to the ground forces of the aforementioned nations starting in 1987. However, because of the increased costs in developing the SP70 (started back in 1972), these nations are cutting back more and more on the number of orders being contemplated.

Several European firms, in the hope of finding a market for sales outside the NATO countries, have taken the initiative to develop models of self-propelled field artillery pieces. As a rule, they are limited to creating a cannon turret mount that is subsequently installed on the chassis of already-in-service basic combat tanks. The Italian firm of OTO Melara and the British Vickers have created their own models of self-propelled howitzers in this way.

The Italian 155 mm self-propelled PALMARIA howitzer based on the OF-40 tank (produced by OTO Melara for export, and the West German LEOPARD-1 tank) is equipped with an indigenously developed piece (barrel length, 41 calibers) that is mounted in an armored turret that rotates 360 degrees and is equipped with automatic loading with a mechanized shell rack for 23 projectiles. The maximum range for regular projectiles is 24 km, and 30 km for rocket-assisted projectiles. More than 200 of these self-propelled artillery pieces have been delivered to African nations. The 155-mm GBT howitzer, developed in the early 1980s by the British firm of Vickers, has a maximum range, with common projectiles, of 24.7 km and 32 km with rocket-assisted projectiles.

Among the capitalist nations which are not part of the NATO block, Sweden, Switzerland, Israel, Japan, and South Africa have experience in building such weapon systems.

In the late 1970s, early 1980s, intensive research and development work in the field of artillery weaponry was expanded in the U.S. They needed to come up with a material base for a new military concept as well as create a self-propelled artillery piece that would anticipate requirements for the 1990s. Primary attention in this regard has been devoted to expanding the combat capabilities of field artillery, the foremost of which is to increase sharply the effectiveness of howitzers and guns firing at tanks and other armored targets at all ranges.

Specialists in NATO have singled out the following basic directions for improving and further developing self-propelled field artillery ordnance: increasing firing range and precision, effectiveness in the munitions' effects on the target, the rate of fire, operation in deployment, the protection, maneuverability, and reliability in the self-propelled mount overall. It should be noted that research and development work conducted in recent years has been primarily connected with creating qualitatively new artillery munitions.

An increase in range is one of the chief demands placed upon modern artillery. In NATO military specialists' opinion, this will make it possible to carry out greater adjustment of fire along a front without changing the firing

positions, and, by using new types of munitions, inflict significant losses on the enemy, primarily on his armored units and subunits (on the march and while deploying). They believe that assuring superior range in one's artillery also allows one to conduct counterbattery combat more successfully. Judging from publications in the foreign press, the ways to resolve this issue are as follows: increase projectiles' muzzle velocity by further lengthening the ordnances' barrels and employ more powerful propellant charges, use liquid explosives as propellents, decrease aerodynamic resistance by improving the shape of projectiles, use special pyrotechnic base attachments ("basebleed" technology) and solid-fuel jet engines.

Increasing the projectile's muzzle velocity by increasing the propellant charge and lengthening the barrel, while simultaneously improving the materials used, is the traditional way to increase range. At the present time, the barrel length of new self-propelled ordnance is not less than 39 calibers. The size of howitzers in the 1960s, as a rule, was in the 23- to 25-caliber range. However, this approach has become, to a greater degree, more limited because it leads to a decrease in barrel life, makes the piece heavy, and decreases the mobility of the self-propelled mount. Hence, specialists in NATO believe that it is not advisable to build barrels that are too long (over 50 calibers). Nevertheless, as the foreign press points out, despite the substantial complication in this technical undertaking, work in this direction is continuing. Several American firms participating in research and development to create a future self-propelled artillery piece for the U.S. Army have developed designs for pieces which have barrel length of 45 and even 50 calibers. In the latter case, the calculated projectile muzzle velocity should be about 1,000 m/sec and the maximum range of a standard projectile, 30 km.

However, in doing this, the strength of the propellant charge also increases on account of using powders with higher energetics, which causes a corresponding increase in bore temperature and pressure during firing. This tightens the demands on the strength and wear and tear on the barrel of artillery ordnance. Western specialists are therefore constantly searching for new technical solutions. The most promising approach, in their estimate, is the use of liquid explosives as propellents in ordnance, or, as they are now called, liquid propellents. The Western military press emphasizes that the use of liquid propellents makes it possible to increase the ballistic characteristics and barrel life (as a result of the relatively low burning temperatures), facilitates the solution to the problem of fully automating the loading process, increases the on-board unit of fire increases the self-propelled mount's service life as a result of liquid propellents' low impact sensitivity, brings down the costs of manufacturing ordnance, and makes their technical servicing easier. In 1984, the U.S. Army command commissioned the firm Ordnance Division to develop demonstration models of a piece using liquid propellents by the early 1990s, allocating them 24.3 million dollars for this purpose.

In the plan for increasing range, Western specialists have laid great hopes on research and development devoted to creating new projectiles. The rocket-assisted projectiles which are part of the inventory of modern howitzers and guns, have made it possible to increase the maximum range by 25 to 50 per

cent. However, it is considered that this is not the limit for such projectiles. American specialists are planning to extend the maximum range of rocket-assisted projectiles to 40 km. The chief drawbacks of such projectiles in comparison to standard ones, as noted in the foreign press, are the diminished weight of the bursting charge and a substantial deterioration of the dispersion characteristics.

In the mid-1970s the Canadian firm of Space Research Corporation of Quebec developed a towed 155-mm gun-howitzer, the GC-45, with a barrel length of 45 calibers, and projectiles for it that had an improved aerodynamic shape. The maximum firing range of these munitions was 30 km, and when a special device, patented in Sweden, called a "base bleed" (a pyrotechnic base that diminishes the base resistance of the projectile by almost 80 per cent) was used, the range was 39 km. By the end of the 1970s this technology was transferred to the Republic of South Africa, where production of the 155-mm G-5 gun-howitzer was set up and where the G-6 self-propelled gun-howitzer with a wheeled chassis was built.

At the present time, the Austrian firm of Fost-Alpine is serially producing an improved variant of the towed GC-45 gun-howitzer with the designation CHN-45. The special munitions for this piece (series ERFB--without a pyrotechnic base and ERFB/BB with the "base bleed" device) are serially produced under license in Belgium. As tests have shown, these projectiles may also be fired from the 155-mm M109A2, M198, SP70, FH70 and other howitzers. The range with the ERFB/BB projectile (in comparison to the American M107 HE fragmentation projectile) increases by more than 40 per cent.

NATO specialists believe that range can be increased by using projectiles equipped with solid fuel ramjet engines. The American firm of Norden is developing such a projectile for the 203.2-mm self-propelled M110A2 howitzer within the framework of the AIFS (Advanced Indirect Fire System) program to be accomplished on U.S. Defense Department instructions. A solid-fuel ramjet engine attached to the projectile has a regulated thrust that is always equal and in an opposite direction to the resultant air resistance. As a result, the projectile glides, as it were, in airless space along an ideal ballistic trajectory. It is expected that its maximum range of fire will be about 70 km and its dispersion characteristics, in comparison to common projectiles, will be twice as good. Work is simultaneously being carried out on developing a homing head and a cassette warhead for it.

The accuracy of modern self-propelled artillery, as with field artillery on the whole, takes on great importance in connection with the demands to increase its effectiveness against tanks and other armored targets at long ranges. Hence, increasing fire effectiveness is a main criterion in the evaluation by U.S. military specialists of proposed designs during the conceptual development of a prospective self-propelled howitzer for the 1990s. This has spurred an effort to make artillery, from the standpoint of combat effectiveness, come as close as possible to becoming a highly accurate weapon. In addition to firing accuracy, this generalized criterion also includes such parameters of artillery systems as munitions effectiveness on the target, the rate of fire, and efficiency of tactical employment.

Along with an improvement in instrumentation to resolve issues dealing with increasing firing effectiveness, a new promising trend was noted in the latter half of the 1970s in the creation of artillery projectiles with terminal guidance or homing. The first representative of this family of munitions is the American 155-mm guided M712 COPPERHEAD projectile. It is equipped with a semiactive laser homing head and aerodynamic steering vanes. Its terminal guidance is by a laser beam reflected off the target. The target can be illuminated from either a forward observation post or from helicopters or drones. Based on foreign press data, the COPPERHEAD projectile, which has a range of up to 16 km, has a high (over 0.5) probability of hitting an armored vehicle (tank, APC, etc.). There are two of these projectiles in each unit of fire for the M190A2 self-propelled howitzer.

Based on foreign press reports, the U.S. is in various stages of developing several types of highly accurate artillery munitions. The 203.2-mm cassette anti-tank XM836 SADARM projectile developed on the instructions of the ground forces command in the late 1970s, has aroused the most interest. It contains three warhead elements with directed-action charges that work on the impact principle. Each element has a radiometric system for detecting an armored target. After locking on the target, the element determines the location of the target's center and calculates the optimal time for the bursting charge to go off (at a height of about 30 m), destroying the tank's upper, least shielded section.

INCREASING THE EFFECTIVENESS OF THE MUNITIONS ON THE TARGET has led more than anything else to broadening the possibilities of field artillery destroying group targets (personnel, tanks, control points, etc.) Foreign specialists have done this by improving existing and creating new munitions. The basic approaches to this solution are as follows:

- increasing fragmentation effects by improving the materials used (including the explosive), designs for projectiles and fuses, and by using finished and semi-finished fragments;

- developing projectiles with a fragmentation pattern cone where the prepared heavy fragments are orientated to the side of the target (the Swedish experimental projectile);

- further improving cassette munitions put into service in the U.S. and other NATO countries' ground forces in the 1970s.

The last approach is considered to have the best prospects in the field of increasing the effectiveness of munitions with non-nuclear payloads.

RATE OF FIRE is one of the basic parameters affecting the firing effectiveness of self-propelled ordnance. This is particularly important during the initial, most effective minutes, of the artillery strike. Thus, in accordance with the demands of NATO specialists, the first three rounds from modern self-propelled howitzers should be delivered in ten seconds, and the normal rate of applied fire should reach 8 to 12 rounds per minute. Achieving such a firing rate can only be accomplished with automatic loading devices. An example of this is the French 155-mm self-propelled F.1 gun where the cycle of loading

the piece is completely automated. The loading mechanism consists of two systems acting in parallel, one of which is designed to feed the projectile on a tray and the other feeds the propellant charge which is packed in a (combustible) cartridge case. The drives are hydraulic. The loading device is controlled by a mechanism based on an electronic logic unit that works on programmed cards. Loading can occur with the piece at any angle of elevation. The 42 rounds of ready service ammunition is distributed about the rear section of the turret in a special two-section rack (the projectiles and charges are separate).

Even though many Western specialists consider that this automatic loading device is extremely complicated and does not provide the necessary level of reliability, the automation of the ordnance loading process for self-propelled artillery, judging from the foreign press, has become a real necessity. Hence, one of the mandatory requirements being imposed on any future self-propelled howitzer for the U.S. Army is the provision of automatic loading. At the present time, the realization of this requirement has been accomplished abroad in two ways. The first one only envisions automatic loading for the projectiles. The propellant charges with this method are loaded by hand into the charge chamber. Such semi-automatic loading, which is already used in the European self-propelled SP70 and PALMARIA howitzers, provides a rate of fire of up to 6 rounds per minute. The full automation of the entire loading cycle is a more complex task because existing propellant charges do not have rigid packing. In order to facilitate its solution, the U.S. is developing propellant charges with hard, combustible cartridge cases for prospective howitzers for the 1990s.

American specialists believe that an automatic loading device for self-propelled field artillery should be able to select automatically the type of projectile, feed it into the breach section of the piece, open the breach block, ram the projectile and propellant charge home, close the breach block, and, if required, eject the spent shell after firing. It should be sufficiently light and capable of operating in a comparatively small space for an extended period and while the self-propelled mount is in motion. It should also allow one to replenish the unit of fire quickly. Even though work in this direction is already quite developed in the U.S. and in other NATO countries, Western specialists assert that until the latter half of the 1990s, the French F.1 will remain the sole system where the loading process is fully automated.

Recently, NATO specialists have been attaching ever greater significance to efficiency in the combat use of self-propelled artillery, which has a significant effect on firing effectiveness where highly maneuvered combat activities are being conducted. In order to meet this requirement in field artillery battalions and batteries, automated fire control systems are being developed. Based on artillery instrumentation data and other intelligence data, these [systems] calculate the initial fire positions and direct them by telephone or radio relay lines of communications to the gunner of each piece (for this reason, howitzers and guns are equipped with digital display units). In order to further increase the efficiency of deploying self-propelled artillery in combat, it has been proposed that each piece have a ballistic computer mounted on it that would increase the autonomy of the piece in

correcting its fire and cutting down on the amount of time to prepare it for firing. A navigational device has also been proposed (to cut down on the time for topographical surveying) along with providing for the automatic laying of the piece to deliver the next round of fire. A portion of these improvements and a number of others directed at extending service life have been included in a program to modernize further the American self-propelled M109A2 howitzer. A new model has been designated the M109A4. The rearming of the entire inventory of M109 series of self-propelled howitzers (more than 1,800 units) to bring them up to the level of the M109A4, is planned for 1987-1988.

Thus, as noted in the Western press, the trend to expand the autonomy of each self-propelled piece has been carried out to increase its survivability. Furthermore, the need has arisen for a special vehicle to deliver munitions that has the same mobility and armored protection as the self-propelled cannon. Thus, in 1983, the U.S. ground forces put the armored M992 into service to transport artillery ammunition. It is built on an M109 self-propelled howitzer chassis. It transports munitions (48 203.3-mm caliber projectiles or 93 155-mm) within a tactical combat zone, and their final loading and feeding is by means of a conveyor transporter to the self-propelled mount. The replenishment of the unit of fire for self-propelled howitzers is done right in the firing positions. Based on specialists' estimate, the U.S. Army's requirements for such vehicles is 1,400 units.

PROTECTION, MANEUVERABILITY AND RELIABILITY in self-propelled howitzers are factors which influence their combat effectiveness and service life. Almost all modern models of self-propelled artillery have armored turrets which protect the crew and vitally important systems from bullets and artillery shell fragments. Aluminum alloys are being more and more widely used for armor. The self-propelled artillery piece is also equipped with filtered ventilation systems that permit accomplishing combat tasks under conditions where weapons of mass destruction have been employed.

The U.S. Army command is planning to pursue the further modernization of the 203.2-mm self-propelled M109A2 howitzer in order to keep it in service until the late 1990s. The basis measure in this program will be the mounting of a hermetic, armored cabin in the howitzer to protect the crew.

Abroad, they are trying to bring the maneuverability of self-propelled field artillery ordnance to a level which corresponds to that of main battle tanks. Therefore, new self-propelled mounts are developed, as a rule, on a tank chassis (or use their basic assemblies and components), and are equipped with multifuel high-powered diesels. Thus, for example, the power-to-weight ratio of the M109A2 self-propelled howitzer engine is 17 horsepower/ton and reaches 23.3 hp/t for the SP70 howitzer.

In developing self-propelled mounts to increase their reliability, foreign specialists, along with using the already- developed assemblies and components of the base vehicles, make broad use of built-in functional control apparatus, are improving mechanisms and fire support devices, are trying to increase the average operation time before a breakdown, are trying to reduce the amount of labor used in technical servicing and repairs, as well as simplify technical maintenance.

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FOREIGN MILITARY REVIEW

B-1 BOMBER PROGRAM DISCUSSED

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 10, Oct 85 (Signed to press 5 Oct 85) pp 43-50

[Article by Col V. Kirsanov; "The American B-1 Bomber"]

[Text] Among the most important directions in the development of U.S. strategic offensive forces, enjoying the special patronage of the Reagan administration, the development program for the B-1B strategic bomber intended for the replacement of the B-52 bomber, which gained the shameful reputation for destroying the civilian population of Vietnam occupies one of the leading positions. In an article which sufficiently exposed in detail the troubles with the development of the B-1B, the LOS ANGELES TIMES newspaper wrote: "It is evident that never in the entire history of the United States has there been a weapon system development program connected with so much opposition over such a long period of time. The development process of this bomber embodies an enormous list of examples of both how the military-industrial complex operates and how personal, professional, political and economic interests of separate individuals, government establishments and weapon manufacturers influence that which in our country has come to be called national security."

Research, conducted by the U.S. Defense Department beginning in 1962, and culminating in the formulation of the tactical-technical objective, established in 1965, within the limits of the AMSA program (Advanced Manned Strategic Aircraft), was the basis of the B-1 aircraft design. In accordance with it, it was planned to develop a new piloted strategic bomber, capable of penetrating the enemy's PVO system at minimum altitudes. In the autumn of 1969, the Pentagon announced a competition for the development of the new aircraft, in which leading American aerospace firms participated. Having examined the proposals submitted by them in June, 1970, the U.S. Defense Department selected Rockwell International to be the primary developer of the bomber. In March, 1972, the assembly of the first experimental prototype of the B-1 aircraft began, and in December, 1974, it completed its flight test. The U.S. Air Force commenced flight trials of the second and third prototypes in 1976, and the fourth in 1979.

In spite of the successful course of the trials, in June, 1977, the president of the U.S. decided to discontinue preparation for the series production of

the B-1 bomber and to concentrate efforts on completing the development of air-launched cruise missiles, intended mainly for equipping B-52 aircraft. Commenting on this decision, the Western press wrote at that time that the primary reason was the alleged extraordinarily-high cost of the bomber. At the same time it was noted that this decision did not mean a complete work stoppage on the B-1 development program, since the U.S. Air Force command, continuing to study variants of the aircraft as cruise missile carriers, commissioned Rockwell International to examine the potential of utilizing the B-1 bomber for this purpose. In addition, on its own initiative, the firm investigated prospects for the development of several specialized modifications of the B-1 aircraft with less cost and wider capabilities for executing specific types of combat missions.

Parallel with this work, the Pentagon conducted comprehensive research to determine the primary directions of development of the future strategic bomber for the U.S. Air Force. This resulted in the conclusion that it must not be a specialized, but a multi-purpose aircraft. It was also noted that the most suitable basis for it may be the B-1. Namely, based on this conclusion, in October, 1981, the president of the U.S. announced his decision to develop a new strategic bomber based on the B-1, and designated the B-1B.

In January, 1982, the U.S. Air Force command awarded Rockwell International two contracts worth a total of 2.203 million dollars to develop and test the B-1B bomber and prepare the basis for its series production. In addition, three contractors were selected, who were responsible for delivery of the engines (General Electric), the on-board offensive radio electronic suite (Boeing), and the electronic warfare system (Eaton). Having received the necessary appropriations, Rockwell International quickly started work on design documentation. Simultaneously with this, the re-equipping of two experimental B-1 aircraft and their outfitting with on-board systems, intended for utilization on the B-1B, began at the U. S. Air Force Flight Test Center at Edwards Air Base (California). In March, 1983, the modernized B-1 completed its first flight according to the B-1B flight test program, and in 1984, trials of a second re-equipped B-1 and the first serial B-1B bomber began. It is stipulated by further plans to add yet another B-1B bomber to the trials in 1986, which is the first serial aircraft able to carry air-launched cruise missiles in the forward bomb-bay.

According to foreign press reports, preparation for the series production of the B-1B began in February, 1982. At Rockwell International's main factory in Palmdale (California), over a period of a year and a half, three new air frames were constructed, designated for final assembling of the bombers and a thorough check of all its on-board systems before conducting flight trials. At the firm's other factories in El Segundo, California, Tulsa, Oklahoma, and Columbus, Ohio, which were manufacturing various element subsystems of the aircraft's structure, construction areas were expanded, new shops constructed, and specialized technological equipment assembled. By the end of 1982, 12,000 workers and engineer-technical specialists participated directly in the construction of the serial B-1B bomber, and by October, 1986, when the production rate will reach the planned level (four aircraft per month), this number will grow to 22,000. According to American specialists' assessments, by this time Rockwell International's general expenditures for developing the

production base will reach almost 400 million dollars, of which approximately 50 per cent will be spent on the restoration of the existing fleet, the purchase of quality control devices and industrial equipment.

Preparation for the series production of the F101-GE-102 turbo-fan engines (TRDD) proceeded no less energetically at a General Dynamics plant in Evendale, Ohio. The first serial TRDD, capable of producing 13,950 kg of thrust, was manufactured in September, 1983. By the end of 1985 it was planned to manufacture 100 such engines, and in all, it is planned to produce 428 F-101-GE-102 TRDD at a total of 1.6 billion dollars.

Along with the large aerospace firms, to which the principal appropriations fall, approximately 5,000 middle and small-sized firms and companies, dispersed throughout the U. S., are also participating in the B-1B bomber's construction. Being guided by their "enthusiasm" fired up by multi-million dollar contracts, utilizing their own production base and having stockpiled component parts located in warehouses since the mid-70s, Rockwell International, according to foreign press evidence, was able not only to develop rapidly the design documentation, but also start series construction of the B-1B bomber. Thus, in May, 1984, assembly of the first aircraft was essentially completed and in September the official transfer of the new bomber to the U.S. Air Force command occurred. In October, 1984, the lead serial B-1B aircraft completed its first test flight lasting 3 hours and 15 minutes (its primary characteristics are listed below).

Crew size.....	4
Weight, tons	
Maximum take-off.....	about 217
Empty.....	82
Maximum payload.....	about 57
Speed, Mach No:	
Maximum.....	1.25
Cruising (at high altitude).....	0.72
While penetrating enemy PVO at low altitude.....	0.85
Returning to base.....	0.42
Service ceiling, m.....	more than 15,000
Ferry range, km.....	11,300
Combat radius, km.....	about 6,000
Take-off distance, m.....	2,500
Aircraft dimensions, m	
Length.....	44.81
Height.....	10.36
Wingspan at 67.5° sweep angle.....	41.67
Wingspan at 15° sweep angle.....	23.84
Wing area, m ²	about 181

Although outwardly the B-1B bomber does not differ from its predecessor, the experimental B-1B, the strength characteristics of a majority of the supporting elements in the wing and fuselage structure were substantially increased. As American specialists calculate, it allows not only the weight of the payload accommodated in the two forward bomb-bays to be increased, but

to equip the aircraft with mountings under the fuselage for carrying an additional 14 individual weapons or drop fuel tanks. With the ninth serial bomber, removable partitions, separating the two forward bomb-bays (their general length is 9.14 meters) will be moved forward 216 meters, which provides the capability to equip the aircraft with new universal revolving launch racks, on which not only "SRAM" guided missiles and nuclear and conventional bombs may be suspended, but also cruise missiles. The remaining free space on the bomb-bay (2.42 meters) is intended to be used for accommodating weapons (for example, bombs) or a 5,800-liter fuel tank.

It is noted in the foreign press that since the the U.S. Air Force command opted for a reduction of the maximum speed from Mach 2 to Mach 1.25 while simultaneously increasing the flight range to 11,300 km, the potential was provided to install on the B-1B bomber simpler irregular air intakes, not having a moveable center housing. The wing sweep is changeable in flight, the angle of which may be changed within the limits of 15° to 67.5° , allowing an optimum speed from supersonic (at high altitudes) to near-sonic (while penetrating air defenses at altitudes of 30-60 meters) and to reduce the take-off distance by 15-20 per cent, in comparison to the B-52. In order to simplify the design and to facilitate technical maintenance, the B-1B is equipped with conventional ejection seats instead of a separate escape capsule. For monitoring the work of the crew during the retraining period, two additional work positions for instructors can be installed in the cabin. As a result of the above-mentioned changes being introduced in the design of the bomber, its maximum take-off weight increased from 180 to 217 tons, which required stronger landing gear with a steerable nose wheel to be installed on the aircraft.

Certain changes were also introduced in the design of the bomber to decrease its effective radar cross section [effective surface of scattering] and reduce its detection by ground-based PVO radars. The curvature of the ducts of the air intakes in the inlet devices and the installation of sloping radio absorption partitions in them screen the engine compressor fans and their direct illumination by enemy radars is prevented. The weakening of the reflected signal strength also occurs because part of its electromagnetic energy is absorbed by special closed-loop windings installed under the casing of operating hatches, made of composite materials, and in certain grooves of the structural element joints. For the same reason, the doors of the bomb-bays, the leading edge of the wing root and engine intakes are covered with materials having radio energy absorptive properties. A phased array, forward hemisphere-scanning radar was installed in the nose of the fuselage with a constant tilt downward of 35° which reduces the level of enemy radar signals reflected forward. Measures for a general increase in the streamline form of the airframe were adopted, sharp edges and straight-line angles in places of bending in the sheathing panels were eliminated, transitions of one surface to another were fused better, and sharp protrusions are absent. The American press confirms that on the basis of complex realization of the aforementioned measures, the radar cross section of the B-1B is not more than 1 M^2 .

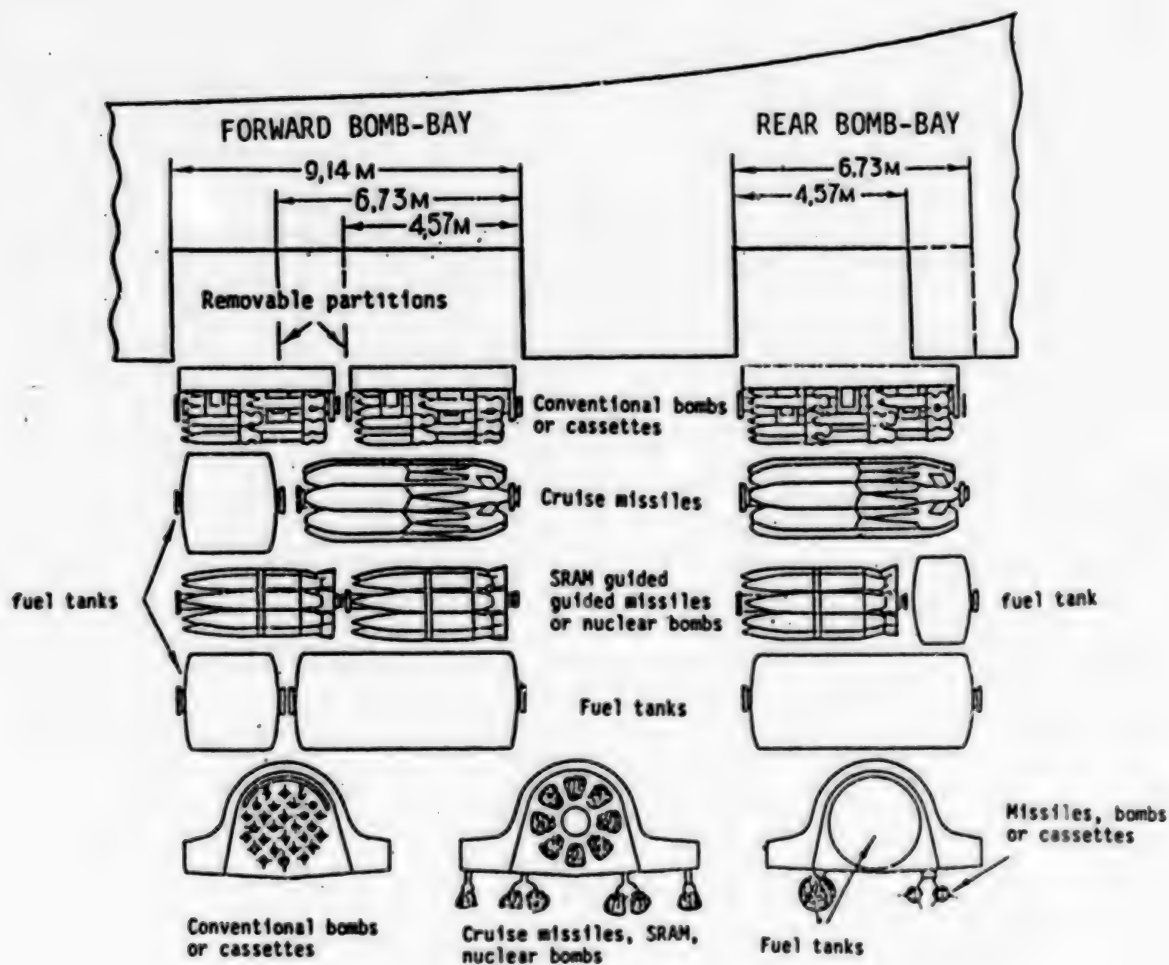
Judging by foreign press reports, the B-1B bomber differs most greatly from its predecessor by the on-board radioelectronic suite, in which the latest achievements in science and technology were used. The most improved radar and

navigation devices, developed for both the newest generation of fighters (for example, the F-16) and the B-52 bomber being equipped as a cruise missile carrier, are installed on the aircraft. American experts consider that in accordance with the design and character of the combat missions executed by the crew, all on-board radio-electronic systems may pertain to systems of an offensive or a defensive character. This is precisely why two operators for the pertinent systems were included in the crew.

A navigation-bombing system, the ASN-31 Doppler altimeter, the AFSATCOM satellite communication system, and the new AN/APQ-164 multi-function forward-scanning radar, which provide the autopilot terrain-following at the lowest altitudes in bad weather and at night, are included in the offensive radio electron systems. The radar, being the most important element of the offensive suite, can create a radar map of the terrain, lying ahead along the course of the aircraft in less than one second, and also can be used for solving navigation problems and weapon guidance. For increasing the reliability, the radar system includes two transmitting and receiving units, completely duplicating one another, and a unit for processing reflected signals. Seven (of the eight installed in the aircraft) on-board AP-101F IBM computers control all offensive system components, the weight of which is 950 kg. The work station for the offensive radio-electronic systems operator is located behind the co-pilot's seat.

The B-1B bomber's defensive suite includes the AN/ALQ-161 electronic warfare system, the AN/ALQ-153 rear hemisphere defensive system, which drops dipole reflectors and IR absorbers. The entire defensive suite weighs 2,300 kg. The primary unit of this is considered to be the AN/ALQ-161 EW system, comprising 97 accessory units of 46 types. Its main mission is to radiate masking or duplicate electromagnetic signals in response to the detection of the first (literally) impulse of an enemy ground or aircraft radar. Thus, American specialists believe it is extremely important to suppress the radar as early as possible in order that the enemy will not be able to notice the appearance of the B-1B bomber. In order to eliminate the appearance of "dead zones" in the signals and interference in the receiver, the EW system receive and transmit antennas are located in the base portion of the wing root, thus providing a circular scan. The control of all defensive systems is automatically accomplished by the AP-101F on-board computer or manually by an operator, whose work place is situated behind the crew commander's seat.

The presence in the aircraft of three internal fuselage bomb-bays, of which the forward two are easily converted into one, and also an external suspension point allows the payload to be widely varied and its composition can be varied based on the character of the assigned combat mission. Thus, with the employment of the B-1B bomber as a carrier of nuclear weapons, it may carry a maximum payload of 22 AGM-86B cruise missiles, or 38 SRAM air-to-ground guided missiles, or any nuclear bombs in one of the following variants: 20 B-28s, 26 B-43s, or 38 B-61s/B-83s. When equipped with conventional weapons, the B-1B can carry: 128 MK82 500-pound or 38 MK84 2,000-pound bombs; 86 CBU-58 or 101 SUU-65 cluster bomb; 38 HARPOON antiship missiles; or 36 naval mines. Several types of payload variants located in the bomb-bay and on the external suspension points of the B-2B bomber are shown below.



Several types of payload variations in the bomb-bays and on the external suspension points of the B1B.

In accordance with Western press reports, by the beginning of 1985, several B-1B bombers were in various stages of construction. The delivery of serial aircraft to Dyess Air Base in Texas began in June of this year. Further plans are intended to deliver 32 aircraft in 1986, 48 in 1987, and 14 in 1988 to units of the U.S. Air Force's Strategic Air Command (SAC), thus completing the program for the development and deployment of the B-1B bomber.

With the delivery of the first aircraft to Dyess Air Base, the planned training of the flight crews and technical specialists began immediately, so that by the end of 1986 SAC's combat ready forces will include the first heavy bomber squadron equipped with 16 B-1B aircraft. As to the arrival of the bomber in SAC, it is planned to deploy them at four bases, the selection of which the Pentagon's primary criteria was to insure the maximum invulnerability of the aircraft on the ground to a surprise strike by submarine-launched ballistic missiles, (based on a maximum flight time of 15

minutes). The bulletin DEFENSE DAILY, published in the USA, confirms that such a reserve of time will give the alert force bomber crews the capability to takeoff in time and withdraw from the air base to a distance which will completely guaranteeing their safety. With this criteria as the foundation, the U.S. Air Force command, apart from the earlier mentioned Dyess, has narrowed its selection to three air bases: Ellsworth (South Dakota), Grand Forks (North Dakota), and McConnell (Kansas), to which it is intended to deploy 26, 32, and 16 B-1B aircraft respectively. In all, it is planned to form 5 combat squadrons with 16 bombers each, and a training squadron having 10 aircraft. Thus, there will be 90 B-1B aircraft in U.S. strategic aviation, 8 in the active reserve intended for employment as an exchange pool, and 2 aircraft intended to be used as experimental models at the U.S. Air Force pilot-test center.

According to American assessments, the total expenditure for preparing 4 air bases for the deployment of the B-1B bomber will reach not less than 300 million dollars. It is planned to spend these resources for the construction of additional hangars, framework for training base buildings, technical services, storage facilities and living quarters. No less than 300 million dollars is also designated to be spent on the acquisition of several types of trainers, required for training the flight and technical personnel. During the course of preparing the bases to receive the B-1B aircraft, a great deal of attention is being directed to questions concerning their security. In the foreign press it was reported that in considering the unique cost of the new bomber, the U.S. Air Force command made a special decision, in accordance with which B-1B aircraft will be guarded as carefully during technical servicing as when sitting alert at special hardstands. It is intended also to prepare and set up special enclosures around the B-1B bomber hardstands, which not only completely precludes access to them by strangers, but impedes the possibility of observing the work of the technical personnel while preparing the aircraft for flight.

Analyzing the B1B bomber's combat employment variants, American military experts proceed from the position that the high tactical-technical characteristics will allow the aircraft to be used for the delivery of high precision strikes on an enemy's stationary and mobile targets with the help of the on-board weapons of various types: nuclear and conventional bombs, air-to-ground guided missiles, and air-launched cruise missiles.

With the entrance of this bomber into service, the Pentagon attaches the innermost hope of achieving its aggressive goals. It, as the journal MILITARY TECHNOLOGY wrote, has at its disposal "the means, allowing an immediate demonstration of force for confirming the readiness to find a way out of a conflict situation under conditions favorable to itself."

It is planned to rapidly increase the number of aircraft in the alert forces, to increase the overall combat readiness of strategic aviation, to accomplish the transfer of part of the bombers to dispersal airfields or to forward air bases.

Since the B-1B was created as a multi-purpose aircraft, the Western press has enumerated the following combat missions for which it is intended to be used:

to participate in a nuclear first strike in accordance with a single operational plan for destroying strategic targets (SIOP) and in subsequent operations if the war is long, employing various weapons, including air-launched cruise missiles launching them, whenever possible, without entering the operational zone of the enemy's active PVO systems; to conduct joint operations to protect sea lines of communication with the U.S. Navy, to lay mine fields, and destroy enemy surface vessels; to carry out strategic reconnaissance on the most important operational axes and to support naval assault landing operations; to operate in support of NATO ground forces in a non-nuclear war, including the interdiction of combat areas. And the foremost missions of the B-1B, according to the journal NATO'S SIXTEEN NATIONS' opinion, will be the penetration of the enemy's PVO system with the subsequent delivery of strikes on stationary or mobile targets deep in his territory. Emphasizing the importance of strategic bombers for executing these missions, American military experts confirm that their portion of the general megatonnage of the U.S. strategic forces is 44 per cent.

Lately, according to foreign press reports, the Pentagon is accelerating the development of plans to deploy the B-1B bomber widely in support of ground troops. Thus, in the European theater of war, these aircraft are intended to be employed to disrupt enemy offensive operations by striking his reserves and organs of rear supply, and also airfields. According to American military experts' calculations, this will allow additional tactical fighters to be freed up for aviation support of the ground troops.

The American press has attempted not to attract public attention to the extent of the appropriations required to complete the B-1B program. Above all, in this connection, representatives of the Reagan administration confirm that the total cost of the program, at 1981 prices, was 20.5 billion dollars, including 2.4 billion for research and development and 18.1 billion for the purchase of 100 aircraft and their spare parts. Other assessments, reflecting the point of view of the Air Force command in which inflation and the increase in the price of raw materials are considered, assess the expenditures to be in the range of 29.5 billion dollars. However, in this case, as Western reviewers note, not all factors are taken into account on which the extent of appropriations allocated for the accomplishment of this program depend. Thus, U.S. congressional budget office specialists figure in not only expenditures for research and development and the purchase of aircraft, but also the price of fuel and POL, the development and acquisition of trainers, pilot training, the purchase of auxiliary equipment and the technical servicing for the aircraft. In their opinion, reached by calculating these additional expenditures and continuing inflation, the total cost of the B-1B program is about 40 billion dollars.

One must note that this figure may also be inconclusive, since lately the loudest voices heard in the U.S. are of those who are fighting for the continuation of B-1B bomber production above the 100 aircraft, established earlier. Thus, as far back as January of 1983, the bulletin INTERAVIA AIR LETTER reported that the B-1B building program may be transformed gradually into an essentially new program, the goal of which will be to develop the B-1C bomber. In its design, it is planned to utilize "Stealth" technology widely so that the aircraft has a competitive capability against the future ATB

bomber being developed by Northrop. Thus, it is highly significant that, at the same time that representatives of the administration completely deny such a possibility, senior Air Force officials, by means of behind-the-scenes maneuvering, are trying to organize a campaign in Congress to support their plans to expand the B-1B building program beyond 100 aircraft. The newspaper NEW YORK TIMES wrote in connection with this that many specialists in government and Congress are hoping that the Pentagon will not limit the purchase to 100 such aircraft, but increase the number to 210, 244 and even up to 300 aircraft. According to an acknowledgment of Air Force representatives, in such a case the expenditures for the program will increase by at least 10 billion dollars. However, they are trying to convince Congressmen that the price of one aircraft will be reduced from 200 to 100 million dollars, as though this is quite acceptable for a modern bomber.

Until now, U.S. legislative organs have satisfied completely the U.S. Department of Defense's requests regarding the B-1B program. Apparently, fiscal year 1986 is to be no exception. According to the 1986 budget, 5.5 billion dollars was requested for the purchase of 48 bombers. The allocation of this sum allows 100 serial bombers to be built and transferred to the U.S. Air Force's SAC by the middle of 1988. However, whether it is really the last, remains to be seen. It is impossible to doubt that the U.S. military-industrial complex will attempt to use all the means available to it to continue the series production of these aircraft, thus assuring itself of several more years of enormous guaranteed profits.

The realization of the plans to develop and deploy the B-1B bomber is one confirmation of the present U.S. administration's aggressive course, which is actively trying to change the existing military-strategic balance in its favor through an arms race. However, a further increase in the arms race will not only have a negative influence on the military-political situation in the world, but in general may also make it impossible to solve problems regarding arms reduction. Also, the development of such events inevitably entails a reduction in the security of the United States itself and its allies. Concerning this, it does not follow to neglect the initiators of military preparations, and those who are inclined to participate in their realization. In this connection, it is appropriate to recall the words said by General Secretary of the CPSU Central Committee, comrade M. S. Gorbachev, at the April (1985) plenum of the Party's Central Committee: "We henceforth will not spare any efforts in order that the armed forces of the USSR may have all that is necessary for reliable protection of our Homeland and its allies, so that no one may catch us unaware."

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FOREIGN MILITARY REVIEW

FRG AIR FORCE REAR SERVICES EXERCISE DISCUSSED

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 10, Oct 85 (Signed to press 5 Oct 85) pp 55-57

[Article by Lt Col V. Sergeev; "FRG Air Force Rear Services Exercise"]

[Text] Continuing militarist preparations, the German armed forces command is paying a great deal of attention to preparing the Bundeswehr rear services to develop the material-technical troop support (MTO) in an emergency and during combat operations. The growing intensity and scale of special exercises of the rear services of all branches of the armed forces, including the Air Force in particular, testifies to this.

Stemming from the probability of great losses of military equipment during combat operations in a future war and the necessity continuously to maintain a high combat effectiveness in the formations and units, the Air Force command considers it advisable to work out in advance a system of rapid repair and restoration of damaged aircraft and other equipment directly in the forces by rear services forces and equipment (without the participation of specialized military and industrial enterprises).

According to foreign press reports, in recent years, rear services planned exercises have been conducted in the Bundeswehr Air Force under the conventional designation LEU (Logistic Employment Exercise) and are part of the operational and combat training of the West German Air Force. As is emphasized in the foreign press, to a great extent all the combat FRG Air Force formations and units participate in them along with the rear services.

The primary goals of the exercise are: to verify in practice the effectiveness of the ways and methods adopted by the Bundeswehr Air Force for the rapid repair and restoration of damaged aviation equipment by the personnel and equipment of the repair-restoration service; to acquire practices for organizing and conducting repairs, and also restoring damaged aviation equipment and weapons by the personnel of the rear units and subunits of the Air Force, to verify practically the experience of the air forces of other NATO member countries and determine the advisability for its being used in the Bundeswehr Air Force.

According to West German press information, an exercise of this series (LEU-84) was conducted in the autumn of 1984. During it, questions were worked out dealing with the repair and restoration of Air Force equipment and weapon systems under emergency situation and during combat. The exercise was conducted in four stages under the general leadership of the Air Force MTO command headquarters (Köln). The leadership of the main Air Force headquarters and of the federal department for developing and purchasing military equipment, representatives of appropriate branches of military industry, and the personnel of the material-technical support group "South" (Karlsruhe), the 1st Aviation Support Division ((Lautingen) and the 2nd PVO Division (Birkenfeld) participated in it. In addition, specialists of other services of the headquarters and units of the Air Force took part in separate stages of the exercise.

In the first stage, methods were tested for putting into service aircraft which were at aviation industry enterprises for repair. According to West German military experts' assessment, the necessity to sharply speed up the rates of repair and restoration work is probably called for by the demand to urgently equip Air Force formations with aviation equipment in connection with an intense situation or surprise beginning of combat operations. For working out these methods, a completely dismantled light ground--attack aircraft, the ALPHA JET, was used and repaired at the Dornier firm's factory in Oberpfaffenhofen. Its assembly by the simultaneously replacement of units and components knocked out of commission was accomplished by simple methods (without the employment of complex technological means). Thus, 52 hours after the start of repair work, the aircraft was ready for transfer to the Air Force.

In the second stage, ways and methods were worked out for correcting damages received by aircraft during combat. For this, an F-104G STAR FIGHTER was used, on which representative damage was inflicted (to the fuselage wings, engines and other assemblies) by means of cannon and other small arms fire for the purpose of creating conditions maximally approaching reality. The 1st MTO regiment's 11th Technical Group (Erding) completed the primary restoration work on the aircraft. The personnel of the Bundeswehr's 91st Test Center (Meppen) and the 34th Fighter-Bomber Squadron (Memmingen) also were used to restore (repair) the aircraft's individual components and assemblies. All this work was conducted in simplified versions and at a rapid pace. Upon its completion, flight trials of the restored aircraft were conducted at Erding Air Base, and, as the foreign press emphasizes, confirmed the high quality of work.

The third stage of the exercise was devoted to studying possibilities and ways to support the constant readiness of computer equipment and calculation--solution units comprising part of the weapon systems of various designations (both ground and on-board systems), and also to determining the optimum variants and methods for correcting damage received during combat operations. Primary attention was paid to maintaining the necessary set of computer programs in constant readiness, and the potential for their rapid processing and correcting revealed errors. This stage of the exercise was conducted at the FRG Air Force Programming Center (Landsberg) and at the 1st Naval Aviation Squadron (Jagel). During it, errors were revealed and corrected in the

programs installed in the CORMORAN antiship missile system, which is part of the armament of the squadron's TORNADO aircraft.

As mentioned in the West German press, the continuing wide-scale equipping of the branches of the Air Force and PVO with computer equipment is presenting to the MTO a series of new problems connected with its maintenance and effective employment in peacetime and especially during war. The investigation and the search for optional ways of solving them was not allotted last place during this exercise.

In the process of the fourth stage, primary emphasis was given to training appropriate rear subunits personnel to organize and accomplishing the rapid repair and restoration of radar equipment, primarily the radar used in aviation navigation and guidance systems and PVO ground-based systems. As was expressed in the foreign press, during peacetime the primary work in maintaining a radar system in working order is accomplished by industrial enterprises. According to the conditions of the exercise, in an emergency situation and a period of combat operations, the help of these enterprises will be completely halted and all work conducted exclusively by Air Force forces and resources. The 32nd Communication Regiment and individual groups of the 2nd Technical School of the Bundeswehr Air Force participated in this stage. As the West German press noted, the exercise showed that a large part of the damages were satisfactorily corrected in a short period of time. In particular, the restoration of a complex wave-form radar was demonstrated.

A critique and summing-up of the exercise were conducted December 11th at Erding Air Base. At this time, a series of reports were issued, video tapes of separate episodes of the exercise were shown, exhibits of appropriate systems, instruments and materials used by the personnel during the exercise were demonstrated.

According to the Bundeswehr Air Force command's assessment, the exercise LEU-84, as a whole, was successful. As a result, valuable experience was acquired in organizing and accomplishing the rapid repair and restoration of aviation equipment and weapon systems during an emergency and directly in combat operations. During the critique, the MTO service's increasing role in maintaining the Air Force at a high level of combat readiness was demonstrated to all. It was especially emphasized that putting damaged aircraft, other aviation equipment and weapon systems back in commission in a short period of time during war will correspond, on one hand, to the rapid restoration of the combat capability of Air Force and PVO formations and units. On the other hand, it may result in, according to foreign specialists' opinions, enemy miscalculations in assessing the true capabilities and composition of the FRG Air Force and the air forces of NATO as a whole, with all the ensuing negative consequences.

At the end of the critique, the Air Force command demanded that: the experience of restoring damaged aviation equipment, acquired in the exercise, be applied to all Air Force formations and units; the search for and the improvement of new methods of conducting the repair and restoration of aircraft, other aviation equipment and weapon systems be continued; the research and development for the acquisition of materials favorable for

conducting the rapid repair and restoration of aircraft, computer and radar equipment, aviation weapon systems, etc. be expanded; and that the experience, amassed by industry in a given sphere, as applied to the conditions and possibilities existing in the Air Force of the FRG be widely employed.

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FOREIGN MILITARY REVIEW

ROYAL MARINES, THEIR EMPLOYMENT UNDER ARCTIC CONDITIONS

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 10, Oct 85 (Signed to press 5, Oct 85) pp 59-66

[Article by Capt First Rank A. Melnikov; "The Royal Marines and Their Employment Under Arctic Conditions"]

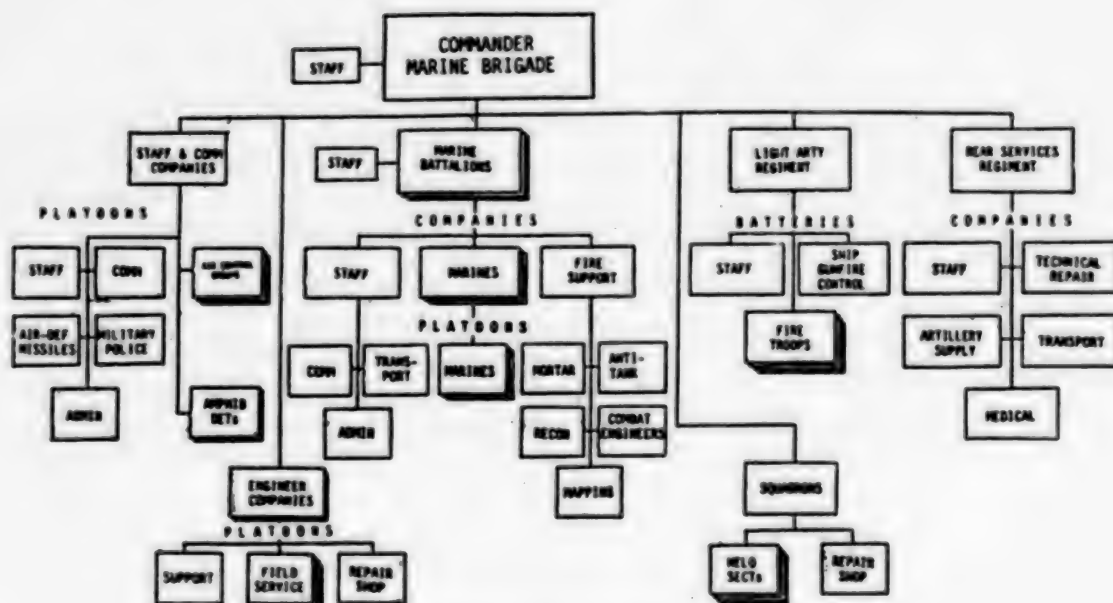
[TEXT] Great Britain is a reliable and one of the most active allies of the U.S. in carrying out the imperialists' aggressive policies. The country's politico-military leadership broadens its military preparedness, accelerates the arms race and calls on its NATO partners to strengthen "Atlantic solidarity." In realizing the expansionist policies of the Tories, an important role is assigned to the 7,000-man Royal Marines.

Units and detachments of the Royal Marines, as the foreign press has observed, are designated for wide use on the NATO flanks, according to NATO strategic planning, in particular in Northern Europe. They have been assigned the following basic tasks: strengthening NATO's combined armed forces in the North European TVD during crisis periods, seizing and holding bridgeheads, destruction of communications in the enemy's rear, and conducting reconnaissance and diversionary activities.

By operational norms, as the foreign press notes, it takes up to 10 days to transfer the elements of the first reinforcing echelon of marines into Northern Norway by sea, and they must have one month's worth of spare parts and supplies for this unique deployment region.

The highest tactical-operational force structure of the Royal Marines is the 3rd Brigade, which consists of a staff, HQ and communications company, 3 battalions of marines (40th, 42nd, and 45th), the 29th light artillery regiment, a rear services regiment, two detached engineer companies and an aviation squadron (see Fig. 1). The brigade numbers over 5,000 personnel.

The HQ and communications company numbers over 500 personnel and includes: 5 platoons (HQ, communications, portable air defense systems (with 12 "BLOWPIPE" guided missiles), military police and administration; 3 air control groups for amphibious assault landing support; 2 detachments of special craft for raiding and diversionary activities (over 80 cutters and inflatable boats).



Organizational Structure of the 3rd Brigade, Royal Marines

A marine battalion (about 800 men) consists of a staff, HQ company (three platoons--communications, transport and administration), 3 companies of marines (3 platoons each); and a fire support company (5 platoons--mortar, antitank, reconnaissance, sappers and mapping). Basic battalion equipment includes 6 82-mm mortars, 18 MILAN anti-tank missile launchers, 48 7.62-mm machine guns (12 of which are medium), 75 vehicles with a cargo capacity of 0.5 to 4 tons, Swedish-made Bv tracked vehicles, and more than 60 different trailers.

The 29th Light Artillery Regiment has six batteries: HQ, 4 fire batteries (with 6 105-mm pieces in each), and a ship gunfire control battery as well as subunits for combat and rear security. The regiment numbers over 700 personnel.

The 170-man aviation squadron has four helicopter divisions and a mobile repair workshop. It includes 12 LYNX and 4 GAZELLE helicopters equipped with the TOW antitank guided missile.

About 900 men make up the rear security regiment which includes five companies: HQ, repair, artillery supply, transport and medical. The regiment has about 180 vehicles and tracked transports.

The detached engineer company includes a support platoon, four field service platoons and a repair shop. Its TOE includes 260 people and 60 vehicles, over 10 construction and special equipments as well as 50 different trailers.

For the amphibious assault and the execution of combat actions in the North European TVD, the brigade has been assigned the 539th amphibious assault detachment, the 845th and 846th squadrons of Royal Navy transport helicopters and subunits of special designation marines of an intelligence and surveillance detachment.

A great deal of attention is paid to the question of special combat readiness of the marines, all-around improvement of their weapons, combat equipment and outfitting, as they are designated for operations in arctic and mountain conditions, to working out close interoperability with marine subunits of other NATO nations, particularly the U.S. and the Netherlands.

Annually, a battalion size group of the 3rd Brigade is sent to Northern Norway for combat exercises. Units include the 42nd or 45th battalion of marines (the 40th is not called upon for training under arctic conditions), one battery of the 29th light artillery regiment, a platoon of the 59th detached engineer company, a section of helicopters from the aviation squadron and units of the rear security regiment, in all approximately 1,500 men. Units of Dutch Marines also participate. They form a joint Anglo-Dutch Marine brigade. The HQ staff of the 3rd Brigade Royal Marines with units of the HQ and communications company can be enlisted to command and reinforce these forces in detached operations.

The main feature of conducting military operations in mountain or arctic conditions is that, as those marines who have participated in arctic exercises confirm, "in these conditions everything is three times more complicated."

The Arctic is one of the most severe climatic regions in the entire world. In Northern Norway in wintertime it is characteristic to observe abrupt changes in air temperature, from +5 to -40°C, high relative humidity and strong winds. In air temperatures around -40°C, breathing is constricted, as a result of which personnel readiness is lowered to a considerable degree. Hard frost is not required for freezing. In the presence of even light winds, the influence of an air temperature of -15°C on unprotected skin is equivalent to 30° degrees of frost.

In such extreme conditions, a serviceman, provided with a set of polar equipment and armed with corresponding weapons and military equipment, must live and carry out combat operations as if he were in a familiar environment. As British specialists state, for successful execution of combat assignments in arctic conditions, three basic demands must be filled: personnel must undergo special preparation; equipment and means of movement must match the climatic conditions and terrain of the location; and weapons and military combat tactics must be selected with regard to the actual conditions.

Survival of personnel is the main problem in carrying out combat activities in Arctic or mountain conditions. The British command considers that each serviceman has to know well the dangers of hypothermia and frostbite, understand symptoms, causes and methods of prevention and cure. This is one of the most important items of combat readiness which is begun in the marine training centers. At a given stage of training, particular attention is addressed to learning about problems related to the peculiarities of military

action in winter, high-mountain conditions as well as to the physical preparation for combat in working out actions under field conditions. The training plan calls for a system of controlled checkpoints of increasing complexity: a 15-km march in full battle pack (standard time is 90 minutes); a 10-km forced march over difficult terrain in full battle pack firing at practice targets (80 minutes); negotiating an obstacle course in normal equipment (no more than 5 minutes); negotiating a so-called "Tarzan trap," passing across a system of suspended rope bridges (no more than 5.5 minutes); a 50-km march over rough country (8 hours) and a swimming exam. Completing these standards by students, is the determining factor for ordering them to service in a marine subunit.

Special survival training for the marines begins in the fall in the mountainous regions of north Scotland. In company-size units, training is conducted by instructors of the military readiness detachment for conduct of combat operations in arctic conditions of the British Marine Department.

A subsequently essential action for training the marines for combat under arctic and mountain conditions is the so-called "winter field exercise," which takes place over the course of 3 months (January-March).

For the first six weeks of the "winter field exercise," the troops are trained in different fashions on courses of varying categories of study. Out of the available time, for those who will operate under arctic conditions for the first time, (annually there are 30-40 per cent), three weeks are spent in survival training under extreme conditions and improving skiing proficiency. For the marines who have undergone this primary arctic training before, a special 3-week course is organized, encompassing all aspects of survival and the improvement of the methods for conducting combat operations under actual mountain-arctic terrain.

In the course of the next six weeks, they are occupied with arranging (for combat) their military detachment into sections (squad-platoon-company); company 4- and 5-day field tactical exercises, with a tactical Anglo-Dutch brigade exercise and, as a rule participation in a bilateral WINTER CLOUD- and EXPRESS-type exercise of NATO armed forces.

The intensity of combat readiness during the "winter field exercise" grows gradually. If in the first weeks, one- or two-day field activities are organized, then in the last month the troops spend about 4-5 days a week of tactical training and field exercises. In the beginning of April, marine subunits return to their permanent deployment sites, and their heavy equipment and weapons are stored in warehouses in Norway.

The Royal Marine command, judging from material in the foreign press, has as an objective the continuing improvement in combat effectiveness and constantly strives to improve means of survival and combat tactics. It designs new types of personal equipment and military equipment, which undergo tests and evaluation under actual arctic conditions during the "winter field exercise."

The art of surviving under extreme conditions is based on common sense and acquired experience, according to Western specialists. The professional

soldier must force himself to execute, under any circumstances, all basic tasks necessary for survival; to worry about himself; to maintain his equipment and weapons in normal operating conditions and to pay attention to the welfare of his comrades. Related as well to the solution of survival problems under arctic conditions are questions of the design of personal equipment and soldiers' nutritional norms. The Royal Marines who conduct combat training in Norway are provided all kinds of specialized personal equipment, the most important of which is clothing. Outer clothing is thick and designed to protect against cold winds, underwear and socks have electric heaters.

Forty-six items are included in a marine's equipment package; among which are waterproof jackets and trousers, styled after military police, polar combat regulation jackets and trousers, quilted linings for jacket and trousers, Norwegian regulation jackets, a warm hat, wool cap, green and white reversible waterproof cloak, polar stockings, a supply of spare, dry underwear, warming covers for toes and knees, woolen mittens, inner and waterproofed outer leggings, rubber gloves, white camouflaged parka and netting, trousers, protective anti-gas suit, rucksack with cover, tent, sleeping mat, snowshoes, Norwegian skis, ski boots, woolen watchbands, protective goggles, three days' rations, and an emergency reserve in hermetically sealed bags, portable stove, thermos flask, compass, etc.

The polar field ration includes dried products and a large quantity of candy. Normal daily intake per soldier is 5,500 calories, which is very important a region where, in just in one night's sleep one can lose 1,500 calories. Food is prepared with water obtained by melting snow.

British polar personal equipment, as the foreign press notes, is rated highly over-all by the majority of Britain's NATO allies and is considered among the best. However, despite this, many servicemen, particularly officers, obtain a considerable number of items with personal funds to supplement the standard issue. For example, civilian underwear with heaters, sleeping bags with poly-fiber insulation, Norwegian Army shirts, stockings and leggings, sweaters and rucksacks.

The issue of changing the existing rucksack is currently under review. According to foreign specialists, it is not completely comfortable while moving on skis. A new model rucksack, which is narrower and higher, while not as broad as an average soldier's body has been developed and tested.

Success in military activities in arctic conditions for the most part depends on the marine subunits' mobility. For movement under polar conditions, they use snowshoes, skis, snowmobiles and wheeled autotransport. The latter is used only on cleared highways and paved roads. When insufficient snowmobiles are available for moving the marines, skis are widely used. The packing of the soldier's personal equipment plays an important role in preserving his combat readiness, such that a load weighing 40-50 kg which a skier carries demands from him great endurance and a reserve of physical strength. In almost all marine subunits of the NATO countries conducting combat training under polar conditions, if given a choice of means of movement--skis or snowshoes--the preference is skis. Snowshoes are used quite seldom, although

in specific cases they are necessary, therefore, all Royal marines carry them as a means of backup transportation.

The best means of insuring increased mobility over arctic terrain is by over-the-snow transport. NATO equipment inventories include the Swedish-made Bv202 tracked articulated carrier, which will be replaced in the near future by the Bv206.

The Bv202E transporter is designated to move personnel and cargo over snowy terrain and has the following characteristics: weight (with trailer) - 3.2 tons; cargo capacity - 1,000 kg; seats - 2+10 (tractor and trailer); power - 90 HP; maximum speed - 40 km/h, over uneven terrain - 10-15 km/h, in water - 3.3 km/h.

There are snow and water models of the Bv206 tracked transporter. Its characteristics: weight with trailer - 4.2 tons; cargo capacity - 600+1400 kg (tractor and trailer); seats - 7+11; maximum speed - 55 km/h, in water - 3.6 km/h. The vehicle can transport fire support equipment for a brigade or battalion which might be deployed to areas considerable distances from main highways. Platoon or squad weapons (84-mm anti-tank grenade launcher, machine guns and ammunition) is towed mainly by skiers on special Norwegian-made "Palk" sleds.

Troop landing is the responsibility of the newly formed 539th Amphibious Landing Detachment, Royal Marines. Tank landing ships and other landing craft, which comprise the detachment, allow the Anglo-Dutch Brigade command to transfer troops and equipment to significant distances along the coast and increases the capabilities for rapid diversionary-assault raids and large-scale amphibious landings.

Low arctic temperatures create definite difficulties in maintaining and using the weapons in the marines' inventory. Lubricating oils harden or become very sticky, leading to a sharp deterioration in a weapon's tactical and technical capabilities. Icing of ammunition, especially in automatic weapons, can cause complete malfunction. For this reason the Royal Marines (at least up to the squad level), operating under arctic conditions, are now equipped with the "BREN L4A4" light hand-held magazine-fed machine gun. The danger, however, exists of condensed snow entering the gunbarrels. A specially-designed rifle sling was developed to solve this problem. In it there is a strengthened cover for plugging the weapon's barrel.

Fire support resources are of special concern for commanders of units operating under arctic conditions. Serious attention has to be paid to preparing fire positions for mortars and 105-mm weapons and also to protecting their ammunition supply. Configuring an 81-mm mortar firing position with a base mounting plate which must be placed on the hard surface of packed snow (but not on rocky ground) takes about two hours. For mortars, deep trenches are dug. Ready-service mortars have only contact exploders which are not sufficiently effective in deep snow. An air burst is more effective under these conditions, but at the present time, as the foreign press has commented, Royal Marines are not supplied with non-contact exploders.

Preparation of firing positions for 105-mm artillery, even with engineer resources present, takes about 12 hours. Such weapons have a full compoex of ammunition, including fragmentation high explosive, non-contact exploders.

Delivery of the basic ammunitions load for all types of fire support weapons remains a complicated problem for the material-technical supply service. One tracked transporter can furnish the ammunition the firing position for only one mortar or one MILAN anti-tank battery. Provision of subsequent lots of ammunition to the position takes a great deal of time and demands considerable forces.

Dependable radio communications in UHF and VHF bands under mountain and arctic conditions are seriously complicated because of the low temperatures, the presence of natural obstacles in the form of mountains, and frequent ionospheric disturbances. British troops in Norway use British-built, government-issue radios to communicate between subunits, higher staffs and with supporting marine elements. As a rule, the radios are in the UHF and VHF bands. Abbreviated tactical and technical characteristics of some of these radio equipments are as follows:

TYPE	K/RRS-355 (Carrier)	K/RRS-349 (Carrier)	K/RRS-320 (Carrier)
Wavelength (MHz)	225-400	37-47	1,5-30
Power (watts)	2.5	0.5	100
Range (km)	10	2.3	80
Weight (kg)	7.6	1.5	25

The features of conducting combat actions using mass destruction weapons under arctic conditions Western specialists believe must be considered far more serious than in moderate climates.

Methods of combat employment of chemical weapons under polar conditions as well as the methods of protection against their destructive factors, differ less than those stated in the combat manuals for troops deployed in Western Europe. Nevertheless, the deep snow cover makes special demands not only on measures to defend against weapons of mass destruction, but also to the whole system of organization. Much attention is given to resources for warning concerning possible destruction by toxic materials, such as indicator/alarms which can simultaneously determine a dangerous level of toxicity and take corresponding measures to protect personnel against its effects.

The foreign press has noted that in the winter of 1984, a special jacket, designed for protection against weapons of mass destruction, was tested on marines of the British and Dutch Brigade. It is to replace the upper part of the combination protective vest Mk3, which all Royal Marines are issued. For comfort, the jacket has a number of pockets with "lightning" clasps.

Among the main reasons for troops being put out of action under arctic conditions is hypothermia, frostbite, and various types of trauma, received during combat training. The percent of soldiers out of action as a result of hypothermia and frostbite, as British specialists have noted, can be reduced

by improving methods of preparing marines for operations under polar conditions. However, the percent of soldiers hurt in accidents remains quite high.

Those suffering from hypothermia are placed in a large sleeping bag. There, they receive hot food and warm each other with their body heat. Curing the most serious cases is done with the aid of a special bag, equipped with an electric heater and fans which operate off a battery.

Western specialists have indicated that curing frostbite takes about 7 days. Under polar conditions a single wounded person paralyze the activity of an entire detachment. Providing a regimental medical point for wounded who are not very mobile requires four people and some kind of transport, for example, special stretcher-sleds, constructed of the wounded man's skis, and a small amount of equipment secured between them.

It is considered that in an actual combat situation, it will be up to the medical staff to make most serious decisions since personnel losses under these conditions will be higher than in moderate climates.

Combat use of forces under arctic conditions, as the foreign press remarks, demands quite a high level of combat readiness and personnel professionalism as well as the use of rather complex personal equipment. The difficulties raised by these extreme conditions are all-encompassing, but will be one and the same for both opposing sides. Therefore, the winner in armed combat will be the one whose personnel are better trained and who have higher quality equipment and better weapons.

In considering this, the military-political leadership of Britain and NATO give the most serious attention to the marines' combat readiness for operations under mountain and arctic conditions of northern Norway.

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FOREIGN MILITARY REVIEW

NEW U.S. NAVY AUXILIARIES DESCRIBED

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 10, Oct 85 (Signed to press 5 Oct 85) pp 66-68

[Article by Capt Second Rank L. Monin; "New Auxiliaries for the U.S. Navy"]

[Text] U.S. Navy headquarters is paying a lot of attention to the development of sea transport resources for hauling cargo for the armed forces. At the same time, emphasis is being made not only for an increase of tonnage but also for a qualitative improvement of the ships' characteristics (increase their speed, universality, development and improvement of on-loading and off-loading capabilities), which should insure their more flexible employment.

In 1981-1982, the Navy acquired, from private firms, eight containerships of the same type which were built at the beginning of the 70s in the FRG and the Netherlands. Soon after that, their reconfiguration to transports with self-propelling equipment was begun (ALGOL T-AKR 287, BELLATRIX T-AKR 288, DENOBOLA T-AKR 289, POLLUX T-AKR 290, ANTARES T-AKR 294). Work on reequipping four containerships had already been completed (T-AKR 287, 288, 293 and 294). Three ships, as reported by the American press, should enter the Military Sealift Command in 1985 and one in 1986.

During modernization of the ship-type referred to, which have been given the designation SL7, a ramp has been installed on each side. This allows on-loading and off-loading to be carried out horizontally. Between the bow and amidship superstructure, a flight deck is being installed, under which there is a helicopter hanger, and in the stern section there is a cargo area for transporting wheeled equipment. Cranes are also mounted on the deck: two with 35-t capacity amidships and one 50-t on the stern. The useable area of covered cargo space, including the hanger, is 12,185 m²; flight deck, 3,302 m² and the cargo area, 1,721 m². The ships' DWT is 28,100 t, length, 288.4 m, beam 32.3 m, and draft, 10.6 m. The steam power plant generates 120,000 hp, which gives speeds up to 33 kts. There is a 42-man crew.

As the American military specialists note, eight SL7-Class ships can, on one trip, transfer the cargo of a mechanized or armored division or the main part of the combat equipment of two divisions. According to the calculation of foreign specialists, the transit from the U.S. to Europe can be made in 5-6 days and to the region of the Persian Gulf in 14-16. One of the possible cargo

variants envisions the transfer of up to 270 tanks and 660 trucks. The lead ship of the class participated in the NATO Exercise REFORGER-84. In this case, as the Western press noted, ALGOL delivered from the Gulf of Mexico to Antwerp, 271 units of wheeled vehicles and 652 automobiles. Transit time was 11 days and off-loading operations took 36 hours. It is reported that ALGOL AKR 287-Class ships will be used primarily for the Rapid Deployment Force.

The striving to provide the capability to off-load quickly in ports where there is a shortage of cranes, either partially or totally destroyed, and also under conditions of an unequipped shore led to the development of container ships with cranes. The first of them, KEYSTONE STATE T-ACS-1, entered service in 1984, after modernization. The 17,782 DWT ship was built in 1966. Its length is 203.8 m; beam, 23.2 m; and draft 10.2 m. It has a 19,250 hp steam power plant which provides a cruising range of 14,000 miles at 20 kts.

During modernization (1983-1984), six heavy-duty pedestal cranes were installed in three pairs along the starboard side. A similar design solution allowed preserving a clear passage through the hold and cargo deck. The cranes can on-load and off-load, not only the ship itself, but also one or several ships (lighters) moored alongside to starboard. Prior to 1989, it is envisioned finishing equipping ten more containerships in a similar way. After trials, KEYSTONE STATE became one of the increased readiness ships of the national defense reserve fleet.

In 1981-1983, the Navy received five CIMARRON (AO-177)-Class tankers (hull numbers 177-180, 186), intended primarily for service at sea in a multipurpose carrier group. Ships of this class can carry 120,000 barrels of fuel oil (1 barrel = 159 l), which, according to foreign press information, is sufficient for two full loads for a conventionally-powered aircraft carrier and 7-8 destroyer-class ships. The tanker has a length of 180.5 m; beam, 26.8 m; and a draft of 10.7 m. Its speed is 20 kts. the Ship has a helicopter pad. They (except the lead ship) are armed with two 20-mm VULCAN-PHALANX gun mounts.

The reinforcement of the Navy's sealift command's ship make-up completely agrees with the American ruling circles' aggressive strategy. As the U.S. press recognizes, the decision concerning the modernization and numerical increases in the auxiliary fleet was made under the influence of the Iranian events in 1979, when the armed forces command arrived at a conclusion concerning the deficiencies of existing tonnage for the rapid transfer of large troop contingents and the support of combat operations of operational formations in remote areas of the world.

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FOREIGN MILITARY REVIEW

NATO NAVIES' CLOSE-IN AIR DEFENSE SYSTEMS DISCUSSED

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 10, Oct 85 (Signed to press 5 Oct 85) pp 68-73

[Article by Capt Second Rank Yu. Tuchkov, reserve; "NATO Navies' Close-in Air Defense Systems"]

[Text] In the course of the never-ending arms race, the high commands of the navies of NATO's aggressive countries have intensively increased their fleets' firepower, and at the same time, they have paid great attention to developing effective methods of surface ship self-defense from attacking, low-flying airborne targets, particularly antiship missiles (PKR), which present a serious threat to them.

NATO naval specialists have come to the conclusion that short range [close-in] antiaircraft installations (ZAK) are a sufficiently effective means of close-in defense for surface ships.

The experience of actual combat as well as research into the disruption of attacks by PKRs flying at low altitude have shown that it is necessary to destroy the warhead at a range no less than 1,000 m from the ship, so there is no possibility for the missile to reach the target by inertia after its guidance and propulsion systems have been destroyed.

Small caliber AA weapons, compared with those of large and medium caliber, have greater accuracy, a very high rate of fire, high speed in slewing both horizontally and vertically and shorter reaction time. They ensure a maximum number of projectile hits on a low-flying PKR, for its certain destruction as well as a flat trajectory and a high initial velocity. Moreover, AA weapons can have sufficient ready-service ammunition to allow fighting off a large number of attacking air targets.

As indicated above, in order to destroy a PKR, it is necessary to secure a direct hit on its warhead which, as a rule, is located in a protected compartment forward of the guidance section. This has required the development of armor piercing subcaliber ammunition with high kinetic energy.

In NATO navies' military specialists' opinion, automated and autonomous ZAKs must contain: medium range acquisition radar, capable of detecting small air

targets against the background of sea surface interference and provide target indication to the firecontrol radar in a few seconds; firecontrol radar for rapid lock-on with maximum degree of probability and tracking of subsonic targets (in future, supersonic) which are executing evasive maneuvers against a background of actual and intentional interference; control apparatus (a computer with a control and indicator panel); small-caliber AA weapons having short reaction time, high accuracy and fire rate.

Acquisition radars are frequently absent in several close-in ZAK systems. In this case, target designation must be provided by shipborne radars or other means of detection.

NATO navies have either built or are designing shipboard close-in ZAKs whose characteristics are displayed in the table. Their particulars will be examined below.

TACTICAL-TECHNICAL CHARACTERISTICS OF SHIPBORNE CLOSE-IN ZAK IN NATO NAVIES

DESIGNATION (COUNTRY)	CALIBER, mm	RATE OF FIRE (rds/min)	WEIGHT (kg) WITH FIRE UNIT	RATE OF TRAIN (deg/sec)	ELEVATION LIMITS (degrees)
	NUMBER OF BARRELS	MISSILE VELOCITY (m/sec)	WITHOUT FIRE UNIT	VERTICAL HORIZONTAL	
VULCAN-PHALANX (US)	$\frac{20}{8}$	$\frac{3000}{1038}$	$\frac{4500}{\cdot}$	$\frac{\cdot}{\cdot}$	$-35 \div +9$
MEROKA (SPAIN)	$\frac{20}{12}$	$\frac{3600}{1215}$	$\frac{6000}{\cdot}$	$\frac{88}{115}$	$-20 \div +85$
SEA GUARD (SWISS, UK)	$\frac{25}{4}$	$\frac{3200}{1470}$	$\frac{5550}{4500}$	$\frac{115}{115}$	$-15 \div +127$
GOALKEEPER (NETH, US)	$\frac{30}{7}$	$\frac{4200}{1021}$	$\frac{6370}{3039}$	$\frac{\cdot}{\cdot}$	$-25 \div +85$
SEA DRAGON (UK, US)	$\frac{30}{7}$	$\frac{4200}{1150}$	$\frac{8234}{5392}$	$\frac{92}{92}$	$-25 \div +85$
SPARENNA-30 (ITALY)	$\frac{30}{2}$	$\frac{1600}{1040}$	$\frac{\cdot}{\cdot}$	$\frac{75}{100}$	$-13 \div +85$
DARDO (ITALY)	$\frac{40}{2}$	$\frac{600}{1000}$	$\frac{7000}{5200}$	$\frac{60}{90}$	$-13 \div +85$

The close-in "VULCAN-PHALANX" ZAK, designed by General Dynamics, is an automatic weapon system, which provides autonomous search and target acquisition. It evaluates the degree of threat and simultaneously locks on and tracks inbound targets and missiles. It is continuously battle ready, has a short reaction time and a high accuracy of fire. Thanks to its modular construction, the complex can be quickly installed on ships of various

classes. It requires electrical power from the ship's system and sea water for cooling.

VULCAN-PHALANX was the first such installation to use a "closed regulating loop" for automatic fire control, in which the probability of hit on a large target is greater than control with an "interrupted regulating loop."

The system includes a tracking radar, guidance equipment and an AA battery. Occasionally there is a search radar as well.

The radar, AA battery and its mechanisms for elevation and train are located on a single mount. The AA battery contains the M61A1 weapon, a system of ammunition storage as well as control circuits. The weapon is a revolving cluster of six 20-mm barrels with each having a cylindrical block.

VULCAN-PHALANX's tracking radar operates in the 2-cm band. It is a pulse doppler radar which conducts target search in a designated scan sector. In U.S. Navy specialists' opinion, it can be coupled with electro-optical detection equipment.

The complex can fire the standard MK 149 projectile as well as armor-piercing subcaliber munitions, M50 (whose rounds have a core of depleted uranium) which are specially designed for fire against incoming missiles.

VULCAN-PHALANX is installed on surface ships of all main classes of the navies of the U.S. Great Britain, Japan and other capitalist countries.

The MEROKA ZAK is being developed in Spain. It is totally autonomous and incorporates fire control radar, optical sights, guidance systems and an AA weapon. MEROKA is unlike other multiple barrel close-in weapons systems. The AA battery includes non-rotating 20-mm "Oerlikon" cannons (laid out in two rows of six barrels each), with belt-fed ammunition from a 720-round magazine.

The fire control radar, linked to the installation, is a pulse-doppler system with moving target selection. The optical sight is used for detecting enemy missiles and providing target designation to the fire control radar. A computer generates and furnishes data to the control panel for opening fire within 3.5 seconds after target detection. The MEROKA system can utilize shipboard radars for detecting air targets.

The weapon system is controlled from a control station located below decks. Ballistic data and related information is fed into a computer at the control panel prior to opening fire. In manual control, an operator feeds the computer target range and speed values. The AA weapons fire fragmentation high explosive shells. Spanish naval specialists believe that the MEROKA characteristics are similar to the American VULCAN-PHALANX, but MEROKA has a greater rate of fire (3,600 rounds per minute) and a shorter reaction time.

The Spanish plan to install MEROKA on all surface ships under construction, as well as BALAERIC-Class destroyers, DESCUBERTO-Class frigates and the air-capable ship (light carrier) PRINCE ASTURIAS.

The SEA GUARD ZAK was designed in 1977, jointly by the firms of Contraves, Oerlikon-boerle (Switzerland), and Plessey Radar (UK). It consists of a search and a fire control radar, control systems and an AA battery. These are all put together in a modular fashion and can be installed separately.

The DOLPHIN search radar operates in the decimeter wavelength with frequency shifting. It can distinguish moving targets and has a range of 35 km. The radar antenna is hooked up with the IFF antenna and both are installed on pedestals, and stabilized in two planes.

The antenna rotates at a rate of 60 r/min. It forms a two-lobe directional beam which allows it to detect attacking air targets at elevation angles from 0° to 70° at altitudes up to 14 km above the surface. The width of each lobe 1.5° in azimuth. The radar measures target range within 10 m and target designation is provided in sector of plus/minus 5° .

The fire control radar locks on and tracks the target by determining its coordinates and speed vector (up to $M=2.5$) at elevation angles from 0° to 90° . It operates in the 2-cm band, with an antenna beamwidth of 1.1° . The target's bearing and range are tracked automatically or semi-automatically (with operator assist). A TV-style display unit is included in the instrumentation of the computer-controlled apparatus.

The weapons system, tied to the fire control radar, has been especially designed for anti-missile warfare. It includes four 25-mm OERLIKON cannons (fire rate of 3,200 rounds/minute), stabilized in three planes. Its armor-piercing, subcaliber rounds have a high initial velocity. Each barrel is fitted with an independent belt system with 1,300 rounds, ready for use. Ready service storage is located in four lockers under the deck, which is designed to permit resupply during action. Angular projectile dispersion is less than 2.2 milliradians. In the opinion of NATO naval specialists, the SEA GUARD ZAK is capable of repelling a 17-missile attack with a 0.85-0.9 probability of hitting low-flying missiles.

In addition to the Turkish Navy, SEA GUARD is being delivered to the Royal Navy for modernization of surface ships and for arming Project-23 frigates.

The GOALKEEPER ZAK was designed jointly by Hollandsie Signaal Apparten (Netherlands) and General Electric (USA).

It consists of a search radar, fire control radar, guidance equipment and an AA battery. The search and fire control radar antennas, as well as the weapons, are emplaced as a single unit on one mount. The fire control panel and other supporting guidance devices are located below decks. GOALKEEPER operates automatically from the moment of target detection to its destruction, and then directs its fire on subsequent targets.

The working frequency band of the search radar (3-cm) guarantees maximum effective target search because of its effective radar crosssection, radio wave propagation conditions and accuracy of coordinate determination. Foreign specialists believe that operations in the 3-cm band allow the radar to detect

small targets at comparatively long range through rain, in fog or in the presence of radioelectronic suppression on the part of the enemy.

The antenna is a slotted waveguide with a beamwidth of 1.5° in azimuth and 30° in elevation. It is stabilized in two planes and rotates at 60 r/min. Rapid area scan increases the probability of target detection, and using a narrow beam and short pulses increases the accuracy of coordinate determination for target designation.

The fire control radar operates in the 3-cm and 0.8-cm bands and tracks targets by a monopulse method. The Kasserine antenna (1 m in diameter) in the 3-cm band has a broad lobe beam pattern for rapid search and target lock-on, and in the 0.8-cm band, a narrow lobe to ensure tracking of small-sized targets flying as low as 5 m above the surface at supersonic speeds. A TV camera is mounted on the fire control antenna, allowing an operator to observe the target visually and determine its azimuth and elevation, but range, in this case, is measured by the radar.

Guidance systems for the battery include a control panel, a computer and other electronic equipment. They generate data for weapon guidance and antimissile fire control. Before opening fire, an operator inputs ballistic and meteorological data by means of a keyboard located on the control panel.

The GOALKEEPER installation uses 30-mm automatic EX-83 weapon, manufactured by General Electric, designed after the GAU-8/A series aviation cannon, which is a rotating cluster of seven barrels. The EX-83 (rate of fire of 4,200 rounds/minute) has a non-linked supply system with a drum type magazine, containing 1,200 ready service rounds. During the course of test firings, projectile dispersion never exceeded 1.2 milliradians. The magazine is completely depleted in 20 minutes; and with the participation of an experienced loading crew in 9 minutes.

GOALKEEPER can fire standard rounds (fragmentation high-explosive incendiary and armor-piercing incendiary), but because of the necessity to blow up the warhead in order to destroy the missile, a special, armor-piercing, subcaliber round (similar in construction to the M50, VULCAN-PHALANX system) made of a tungsten alloy and with a depleted uranium core was designed. The first 12 systems are designated for installations in KOURTENAAR-Class FFGs.

The SEA DRAGON ZAK was designed by Vickers, Ferranti, Marconi (UK) and General Electric (USA). It consists of a search radar, fire control radar, guidance systems and the weapons, which are installed in four modules: search, weapons, console and threat evaluation.

The search radar is a pulse doppler system, fully coherent over the wavelength range thanks to the use of a transmitter in a traveling wave tube. Its antenna is stabilized for the ship's pitch and roll and is a slotted waveguide with parabolic dual-curved reflectors, which form a dual-lobe beam pattern (the upper lobe is used for target detection at medium altitudes, the lower is for low flyers), and with minimal sidelobes in the horizontal plane which reduces the radar's vulnerability to interference caused by an enemy's active jamming.

The radar uses pulse compression, frequency shift and moving target discrimination. The first two features significantly improve the anti-jam capability as well as the target acquisition characteristics. The radar can detect low-flying PKRs at 15-25 km, depending on weather conditions and the presence of natural interference.

The fire control radar is a monopulse, frequency shift system. It has a Kasserine antenna which tilts horizontally plus/minus 30° and vertically from -7° to +15°.

Among the guidance components are a threat evaluation computer, a control panel and supporting electronic equipment. The computer processes data (from other shipboard radars as well) and performs target designation. It can be hooked up with other weapons systems installed on the ship. Evaluating the movement parameters of detected targets relative to the course of the ship being defended, the computer determines the degree of threat from each of them and issues orders to open fire (up to four installations) for repelling single or massed attacks. One operator can control the entire complex in automatic. A manual (backup) method of fire control of one installation is possible with the help of a hand crank on the control panel. In this case, target information comes from a TV camera to the operator's monitor. In this case a circular scan indicator, located on the control panel, provides the operator all information received from the search radar.

The weapons module, collocated with the fire control radar is a light, compact unit, consisting fundamentally of a GAU/8A 7-barrel (rotating barrels) 30-mm aviation cannon manufactured by General Electric. A 1,160-round service locker is situated under the weapons mount and rotates with it while tracking the target. It uses armor-piercing, subcaliber rounds with a tungsten core.

The DARDO ZAK was built to the order of the Italian Navy by the firms of Breda Meccanica and Elmag. This is a very large-caliber close-in system which in addition to combat against low flying missiles, is also designed for gunfire against sea and shore targets. It incorporates a fire control radar, guidance systems and weapons. The system is linked to the ship's RAN-10S air and surface search radar (which provides target designation for one or several DARDO systems). It is also linked to the navigational devices.

The DARDO system uses the RTN-20X ORION fire control radar designed by the Italian firm Selina. This coherent, monopulse radar with moving target discrimination, operates in the 3-cm band and has a range of 12 km. Rapid frequency shift gives it a high anti-jam capability.

Guidance systems include a computer and a control panel. The computer processes data, obtained from the ship's RAN-10S air and surface search systems and navigational equipment and after evaluating the threat level, provides target designation to the ORION radar for lock-on and tracking.

The system uses the BREDA COMPACT 40-mm twin barrel turret mount. It was chosen because of its full automation, high rate of fire (600 rounds/min), accuracy (dispersion is no greater than 1 milliradian), short reaction time and high reliability.

In firing against anti-ship missiles, they use high explosive rounds with semi-ready MK-2 combat elements from the firm "Bofors," with an influence fuse which, according to Italian naval specialists, increases system effectiveness.

Against missiles at ranges of 1-3 km, the calculated probability of hit is 0.98. The Italian naval command believes that the anti-ship missile defense capabilities of the MAESTRALE- and LUPO-Class guided missile FFGs, have considerably increased by installation of the DARDO system.

The SPARENIA-30 ZAK differs from the DARDO system only in weapons. As an alternate to the BREDA COMPACT, the Breda Company has designed the COMPACT 30-mm twin-barreled turret mount which has a rate of fire of 1,600 rds/min, with a capacity of 12,000 ready service rounds. This system, in foreign specialists' opinion, is sufficiently effective against massed missile attacks.

NATO countries' naval commands believe that the arming of surface ships with anti aircraft close-in artillery significantly broadens their self-defense capabilities against missiles, attacking at low altitudes. Effective defense is achieved by guaranteed detection of the missile; quick reaction time; reliable lock-on and tracking the missile against the background of natural and intentional active and passive interference; automatic correction of fire trajectories, guaranteeing a direct hit on the target; high firing accuracy; achieving a small dispersion of fire; reliable weapons; and ammunition especially designed for this type of target.

1. The essence of this new type of weapon guidance is that the system, during firing, simultaneously determines the position of the target and the shells in their flight path, relative to the target. If the direction to the target and the shells' trajectory do not coincide, then the system automatically corrects the firing data being generated in order to direct the shells precisely at the target.

In the "interrupted regulating loop" method, which is widely used in various navies, fire control instruments continuously determine the parameters of target motion. On the basis of this, initial firing data are generated which are not corrected. The probability of target kill in this case depends on the accuracy of fire control system operations and the calculation of all initial fire data corrections--Yu. T.

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FOREIGN MILITARY AFFAIRS

SOVIET MILITARY JOURNAL ON REEQUIPMENT OF FRENCH NUCLEAR SUBS

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 3, Mar 85 (Signed to press 5 Mar 85) p 74

[Article by Captain 2nd Rank S. Grechin; "Reequipping French SSBNs"]

[Text] The French military-political leadership pays constant attention to the improvement of nuclear missile submarines which are the country's main strategic nuclear forces. As it appears from the foreign press, in 1982, the naval forces command, in whose complement they are included, developed a plan for employing them up to the mid 1990s. One of the most important points of that plan is the reequipping of four of the five REDOUBTABLE-Class SSBNs (replacing the M20 missiles with the M4).

As C. Ernu announced when he was the French Minister of Defense, full-scale production of multiple warheads for that missile had already begun. The M4 missile, judging from recent Western press data, has the following characteristics: range, 4,500 km; launch weight, 35 t; length, 11.05 m; diameter, 1.93 m; MIRV-Type multiple warhead (six 150-kt warheads). L'INFLEXIBLE (S-615), transferred to the fleet in April of this year, was the first nuclear submarine to be equipped with those missiles.

Foreign specialists estimate that the reequipping of each submarine will take, on the average, 2.5 years. It is proposed to carry out the reequipping at the naval ordnance depots in the cities of Brest and Cherbourg in the following time frames: Le TONNANT (S-614) (March 1985 - December 1987), L'INDOMPTABLE (S-613) (January 1987 - October 1989), Le TERRIBLE (S-612) (January 1988 - July 1990), and Le FOUDROYANT (S-610) (October 1989 - April 1992).

As reported in the foreign press, Le TONNANT (SSBN S-614) was withdrawn from active service and entered major overhaul in March 1985. During the overhaul the following will be accomplished: launch tube modernization, strengthening of the pressure hull, replacing individual assemblies and units, and the installation of more-improved electronic equipment.

It is emphasized in the Western press that equipping nuclear submarines with the new M4 missile will lead to a significant enhancement of the country's nuclear potential and increase the sea-based strategic forces' combat

capabilities since the number of nuclear charges on just the four SSBNs it is planned to reoutfit will grow from 64 to 384 units, i.e., by a factor of six.

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FOREIGN MILITARY REVIEW

COMMAND OF CANADIAN FORCES IN EUROPE

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 10, Oct 85 (Signed to press 5 Oct 85) pp 75-76

[Article by Col S. Semenov; "Canadian Armed Forces Command in Europe"]

[TEXT] The Canadian armed forces command in Europe is the only group of Canadian armed forces located outside the boundaries of its territory. In peace time, it is subordinated to the country's national defense staff, but in wartime it is operationally subordinated to the NATO Joint Forces Command in the Central European TVD. Canadian forces in Europe number 6,700 men. Organizationally they include the 4th Mechanized Brigade, the 1st Canadian Aviation Group, and supply and service subunits.

The 4th Mechanized Brigade (its staff is at the Lar Airbase in the FRG) is intended for operations as part of the NATO CENTAG and is part of its reserve. The brigade includes two motorized infantry and one tank battalion, artillery and combat engineer regiments, and subunits for combat and rear support. Personnel strength is 3,200. In its armament there are 59 German-built LEOPARD-1 tanks, 375 armored personnel carriers and armored vehicles, 24 155-mm self-propelled howitzers and 40 TOW anti-tank launchers.

The 1st Canadian Aviation Group (its staff is at the Lar Airbase in the FRG) is intended for air support for the 4th Mechanized Brigade during combat operations. Operationally, the air group is assigned to the Canadian Air Forces Command. In peace time, it is operationally subordinate to the staff of the NATO Joint Air Forces 4 OTAK in the Central European TVD. There are more than 1,000 men assigned. In it there are three fighter-bomber squadrons, one helicopter squadron and a transport aircraft detachment. The group has a total of 54 CF-104 STARFIGHTER aircraft (in 1985, it is planned to replace them with CF-18 American-produced HORNET aircraft), 2 CC-132 transports, and also 11 reconnaissance and communications CH-136 KAYOVA???? helicopters.

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FOREIGN MILITARY REVIEW

DEVELOPMENT OF F-19, STEALTH TECHNOLOGY NOTED

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 10, Oct 85 (Signed to press 5 Oct 85) p 76

[Article by Col Yu. Alekseev, Candidate of Technical Sciences; "The American F-19 Aircraft"]

[Text] The passion in the Western press about the American "stealth" technology, by which the Pentagon hopes to build an aircraft which is "invisible" to enemy air defense radars, is not subsiding. Western reviewers confirm that the American firm Lockheed has already developed a fighter using this technology which has received the official U.S. Air Force designation of F-19 (the aircraft's tactical-technical characteristics are given below). They believe that its creation as an experimental aircraft under the provisional designation HAVE BLUE was begun in 1975 and flight tests of the aircraft's first experimental model were carried out in 1977 under the designation XST.

F-19 Tactical-Technical Characteristics

Crew	1
Weight, tons:	
Empty	about 10
Take-off with full internal fuel load, full allowance of air-to-air and air- to-ground missiles, reconnaissance and electronic warfare equipment	about 15
Cruising speed and speed while conducting reconnaissance, in Mach No.	more than 2
Operational ceiling, m	20,000
Combat operational radius, km	700-1,000
Aircraft dimensions, m	
Length	17.8
Height	3.6
Wing span	8.9
Wing span with wing tips folded	5

Judging by foreign press material, the F-19 fighter, conforming to U.S. Air Force requirements, is intended for conducting reconnaissance in areas with strong air defense while simultaneously providing the capability for suppressing ground-based enemy air defense electronic resources for which it will carry on board air-to-air guided missiles and anti-radiation missiles and also aerial cameras and electronic warfare equipment. Armament is mounted on the bottom part of the fuselage in conformal suspension assembly which does not degrade essentially the aircraft's aerodynamics and does not increase its effective scattering area [radar crosssection].

As the foreign military experts assume, in developing the F-19, Lockheed used many technical solutions tested in the SR-71 aircraft, in particular its external shape. It has a semisupporting fuselage and delta-shaped variable sweep wings. The power plant consists of two F404-GE-400 afterburning ducted fan turbojet engines (maximum thrust about 7,260 kg), mounted in the upper part of the fuselage. The engines' exhaust nozzels are shielded from the side by the wingtip's bottom hemisphere. Laminated air intakes are mounted on each side of the fuselage. Composite materials are widely used in the aircraft and steps were taken to reduce significantly its IR radiation. In American specialists' opinion, the sum total of similar measures will allow the F-19 fighter to be invulnerable from enemy air defense resources.

It is noted in the Western press that the aircraft's primary flight tests were conducted at Nellis AFB. the experimental part of the program was completed in 1981, and the U.S. Air Force gave Lockheed an order for the first consignment of 20 aircraft. They believe that, at the present time, pilots for the new fighter are being trained. It is planned to use C-5 GALAXY transport aircraft to deliver F-19 aircraft to places of operational employment. To do this, the wings must be folded.

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